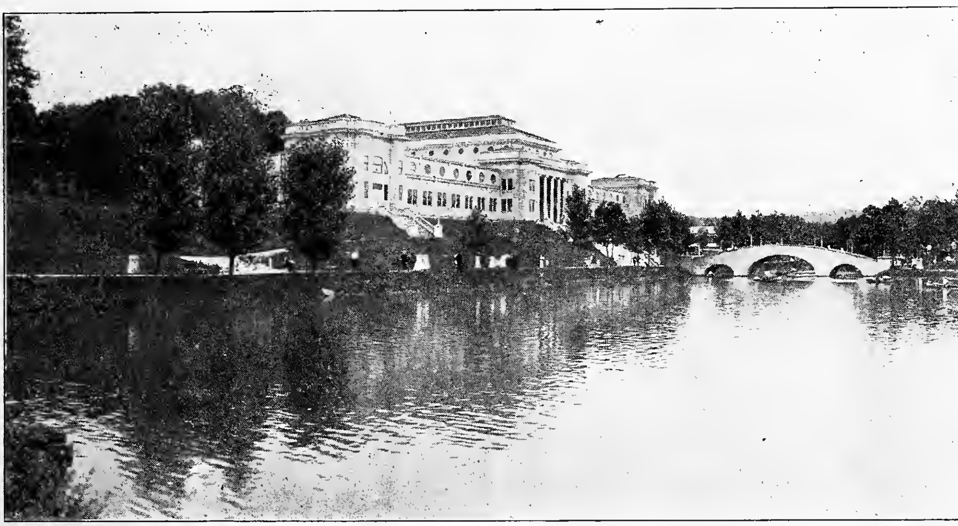
THE
U. T. FARMER



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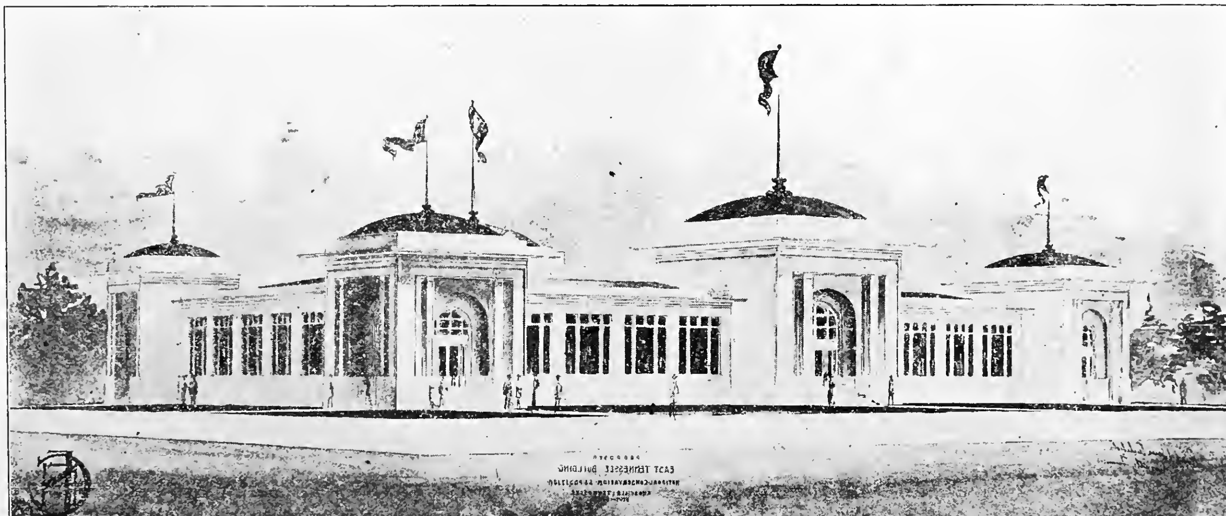

East Tennessee Building, National Conservation Exposition.

THE U. T. FARMER

Vol. 8. OCTOBER, 1913. No. 1

THE BERKSHIRE ON THE FARM, IN THE SHOW RING, AND ON THE BLOCK.

By L. P. GABBARD, '15

The domestic hog is kept solely for its flesh and fat. This means that the hog which will give the greatest amount of meat and lard of the best quality at the least cost, other things being equal, is the most profitable hog to keep on the farm. Thus it becomes evident that utility is the farmer's first consideration in hog-raising. It is the touchstone upon which his success depends. He should never cease to ask himself why he is breeding the animal of his choice. Is it to humor the whims of the few or to meet the demands of the many? He must know that his hog must meet the demands of the market. If it does not meet the demands of the market and the requirements of the packer; if it contributes little toward paying the rent and lifting the mortgage when placed in the hands of the average farmer, then it is a waste of time, effort and money to continue its production. It must satisfy both the demands of the farmer and those of the butcher. The butcher requires an animal that will give him the largest proportion of valuable meat, while the farmer wants an animal that is hardy, adapting itself readily to different climates and foods; one that is prolific, and capable of making rapid and economical gains. Fortunately, we have all these requirements met in one hog, the Berkshire.

The adaptability of the Berkshire to environment is of the first class. No breed of swine is fed and bred under more varied conditions with the success that is attained with the Berkshire. Its strong constitution fortifies it against disease. It is found growing successfully and meeting with favor in the North, where the winters are severe, and in the South, where the summers are hot. It thrives equally well on the alfalfa of the West, the cow pea of the South, and the red clover of the North. This, coupled with its outstanding qualities as a general utility hog, explains in a way its popularity and wide distribution.

The Berkshire is the most widely distributed hog on the face of the earth. It was first introduced into the United States about 1823, more important importations were made later. Since the time of these early importations it has never ceased to grow in popularity, despite the unfavorable conditions of a newly settled country, with which it had to contend. Today the Berkshire is found in every state and territory of the Union and quite extensively in Missouri, Tennessee, Illinois, Kentucky, Indiana, Iowa, Louisiana and Mississippi. Furthermore, it is found in every province of Canada, throughout England, Scotland, Wales, Ireland, and has found its way to South America, the Hawaiian

Islands, and Japan. From herd-book figures it is calculated that there are more than 160,000 pure blooded, registered Berkshires in the United States—a most excellent showing when the time of the first importation is noted.

The Berkshire ranks high in early maturing qualities, and as a rapid feeder and economical gainer is surpassed by no other breed. This fact has been conclusively demonstrated by many competitive breed tests held throughout the United States, Canada, and Europe. It is safe to say that no breed has had such extensive trial, and certainly no breed has had such high records accredited to it. Prof. Plumb, in his *Types and Breeds of Farm Animals,* speaks of numerous American experimental stations that have used pigs of this breed in feeding experiments, from which the following records are quoted. At the Iowa Experiment Station the Berkshire made an average daily gain of .98 pounds; the Poland China made an average daily gain of .90 pounds, the Chester White made an average daily gain of .89 pounds; the cost per 100 pounds of gain being $2.33, $2.23, and $2.46 respectively. At the Ontario Agriculture College the average of trials for four years show almost identically the same gains. At the Massachusetts Experiment Station, seven Berkshires, fed 140 days, made an average daily gain of 1.16 pounds each, requiring 289 pounds of food for 100 pounds of gain. Experiments held in Wisconsin, Michigan, Vermont and Canada show that the Berkshire required from 15 to 70 pounds less feed to make 100 pounds gain in live weight than did the Poland-China, Chester White, Duroc Jersey and Yorkshire. From these records quoted above and others published elsewhere it is very evident that the Berkshire justly merits the highest rank as a rapid feeder and economical gainer.

Prolificacy is a quality which the farmer cannot afford to neglect. The brood sow that farrows twelve pigs and raises ten is worth twice as much as the sow that farrows seven and raises five. If the sow that raises five pigs pays expenses, the one that raises ten will have five for the profit of the owner. Berkshires are accredited high rank in this respect, not only by those who have bred them for years, but by litter tests which have been made. Dr. A. W. Bitting, in an extensive study of there breeds in this relation, the Berkshire, Poland-China and Texas Razorbacks, found the following to be true:

Average size of 400 Berkshire litters, 8.22 pigs.

Average size of 600 Chester White litters, 8.96 pigs.

Average size of 1086 Poland-China litters, 7.45 pigs.

The above data places the Berkshire second. By some authorities they are given first rank, and records of other tests are given which incidentally place the Berkshire first. If, however, their litters are not so large as those of some less desirable breeds, there is compensation in the fact that as kind and careful mothers they are unsurpassed. Furthermore, tests reveal the fact that Berkshire sows yield more milk than other breeds. In a test covering 84 days we note the following:

Breed	Age	Wt.	No. Pigs in Litter	Av. Daily Yield	Total Yield
Berkshire	2	390	7.7	6.31	532
Poland-China	2.75	393	7.5	4.86	429
Razorbacks	1.75	247	6.3	5.17	434

These figures show that the Berkshire not only excels in the total yield of milk, but also in the butter fat content. This is very favorable to the raising of large litters. As a result fewer "runts" are formed and a more rapid growth is maintained, giving the pig the best possible start before being put on dry food. This fact is very significant, since the farmer's profit depends largely upon the size of the litter, the number of "runts" formed, and the rapidity with which the pigs grow. Incidentally, this table also shows that the Berkshire excels in the size of litter produced.

The Berkshire is not only prolific, but very prepotent. Being one of the oldest breeds, long bred with care, its prepotency has become well established. Its beautiful conformation, uniformity of color, and pronounced vitality are, when bred pure, easily transmitted from generation to generation.

To sum it up, their size, ready growth, hardiness, easy fattening, docility, uniformity and wide adaptability, commend the Berkshire to breeders everywhere. They are robust, active and vigorous, rendering them less susceptible than others to disease. The sows are prolific, careful nurses and good sucklers. These, together, with the best qualities in meat, are the outstanding points of excellence which should place "Berkshires on Every Farm."

But the outstanding good qualities of the Berkshire are not limited to the farm. He is no less attractive in the show ring and useful on the block. In this situation he has been repeatedly declared champion. It is a common occurrence for a carload of Berkshires to win out when ten or more other breeds are pitted against them. This was demonstrated at our last International Stock Exhibition at Chicago. But breeders are not content to rest from the good results of their labors; instead, they are taking every opportunity to overcome or correct any little weakness in the breed. The public sales and exhibits at the State Fairs in 1912 were better than ever before. They were outstanding in their excellence and justly won supremacy in the swine exhibits at the last International Live Stock Exposition. Hear what the Breeder's Gazette has to say in regard to this particular event: "Berkshires made the most representative and decidedly the strongest exhibit which the breed has thus far contributed to the International Entries. In its individual superiority and freedom from mediocrity it was one of the most noticeable exhibits of the last decade."

By common consent the Berkshire is accepted as the most handsome of all breeds. It is the aristocrat of the swine family. The symmetrical outline, with pricked-up ears and well-turned head, gives it an attractive finish and style. It is the acme of perfection in the eye of the real fancier,

who loves that which contains the most useful qualities combined with carriage and style. In no other breed do we find this blood-like appearance so evident. Mr. Lovejoy, speaking of the Berkshire, says: "One likes to look upon a handsome animal, even though it be a hog, and in this respect there is no comparison with any other hog in the world." Its smooth, symmetrical form, active movements, and uniformity of color and markings never fail to attract the attention of the judge in the show-ring, and seldom fail to convince him of the superiority of the Berkshire over other breeds.

The final and best test of any hog is its ability to supply the block and fill the pork barrel. The hog, to do this most satisfactorily, is the one that can do so at the least cost per pound and at the youngest age. It must produce the most best cuts, having the least waste, and besides carry desirable breed characteristics. As all packers agree, the valuable parts of the hog lie behind the shoulder and the cheapest in front of it. The highest price cuts are found in the loin where the nice, juicy chops are obtained, in the sides from which the dainty strips of bacon are cut and in the hams where the rich, delicious steaks are sliced. The cheaper cuts are in the shoulder and neck, and the cheapest in the head and jowl.

Let us see if such a hog is found in the Berkshire. To begin with he is the longest hog behind the shoulders in the region where the most valuable cuts are obtained, the loins, hams and bacon, and the shortest in front of the shoulders, where the least valuable and undesirable cuts are produced, the head and the snout. Thus the Berkshire carries a greater amount of valuable meat and a smaller portion of cheap meat than any other hog. These characteristic points of excellence are verified by actual measurements and weights. The following experiment expresses in percentages, based on a thorough chemical analysis, made by the Division of Chemistry of the United States Department of Agriculture, the entire dressed animal.

Breeds	Wt. in pounds	Water	Fat	Nitrogenous Substances	Lecithin	Ash	Total
Berkshire	129⅗.	43.10	40.46	13.02	.29	2.57	99.42
Tamworth	141	41.09	42.97	11.99	.17	2.63	98.85
Chester White	125.⅘	35.80	51.11	9.85	.17	1.84	98.77
Poland China	146.⅖	37.83	48.90	9.66	.19	1.83	98.41

This anaylsis shows that the Berkshire dresses out better than any of the other breeds with which it is compared.

Professor Ferguson, of Swift and Company, states that Berkshires furnish the highest percent of first-class hogs that are sold on the market. Mr. C. R. Gentry, hog buyer for Armour, says that in his experience he finds that the Berkshire dresses out better than any other breed. The outstanding excellence of the Berkshire makes him at once the favorite of the buyers. They see in his great back, long smooth sides, and excellent hams those points demanded by the market. It is for this reason that we find the Berkshire

bringing the top price in our greatest markets. Mr. Lovejoy tells of his experience with a carload of Berkshires. Prices being low, he carried them on to a weight of 405 pounds. They were shipped to Chicago. When the top of the market was that day $3.85, this carload brought $4.25. The carload of forty head shrank only 85 pounds, thus showing the firmness of the meat and the slight shrinkage. Mr. E. D. King has often topped the Kansas City market with carloads of his Berkshires. The late Mr. Guy Barton did the same thing with his Berkshires in Omaha market, and the like is being repeatedly done the world over where Berkshires are fed and bred. If you ask why, there is but one answer, utility. The packer cares but little, if any, for the breed. He wants a hog that will give the highest percentage of salable meat of the best quality, of the finest texture, and of the most delicious flavor. All of this he finds in the Berkshire. The meat of this breed has a fine grain, and a desirable blending of fat and lean. Fed in the same manner, in comparison with the Poland-China, Chester White, and Duroc-Jersey, the Berkshire will show a class of meat with a larger percentage of lean than any of them. In feeding experiments conducted by the Indiana Station, in a comparison of Berkshires and Poland-Chinas bearing on the influence of food on carcass, the larger percentage of lean to fat in the Berkshire was strikingly shown. Where properly fed this pig produces a high class of bacon. There is, as has been said before, a better distribution of lean and fat, thus making it superior as breakfast bacon, which, as we all know, is one of our highest-priced meats. Berkshires, on account of this fact, have won many carcass contests at the National and American Royal Expositions.

In conclusion, let us briefly review the facts in favor of the Berkshire. To begin with, they are, as has been said, robust, active, and vigorous, rendering them less susceptible to disease. They grow rapidly, fatten readily; are docile, uniform in size, and adapt themselves readily to different climates and foods. The sows are prolific, careful mothers, and good sucklers. They are very prepotent, and when bred judiciously, transmit their good qualities from generation to generation. They produce the very highest quality of meat at a minimum cost of production. In short, they are a general utility hog, just the hog the farmer needs and the market demands—one that produces large litters, matures quickly, fattens readily; one that produces the very highest quality of meat in the greatest quantity at the least cost; one that brings the top price in the market, and captures the blue ribbon in the ring. This the Berkshire has done, is doing, can do, and will continue to. So, let my last word to the farmer be a plea for more Berkshires on more farms.

WHY SHOULD THE BOY LEAVE THE FARM?

By F. S. CHANCE, '14.

There are many necessities on the farm and the most essential of all these are the boys. It can well be said that rural life depends upon the crop of boys and that this is a crop that never fails. Seeing that the boy is of such vast importance, why not guard his interest with every precaution possible?

It is a well known fact that many boys leave the farm and go to the city, but why should this be the case? It would not be the case were it not for certain agencies which gradually draw the young, as well as the old, city-ward. The first and perhaps the major of these agencies may be traced to the unsocial condition of rural life. Another agency that is very prominent in the boy's drift city-ward is the way he is used on the farm. In many instances he is used as a slave or a hired man, when he should be taken in as a partner and given a "say-so" as to what team to work, which field to cultivate, and how much of each crop to plant. These and many other debatable questions should be worked out with the boys' assistance. Instead of that the father often solves the problems for himself and gives his orders to the boy as if he had no interest in the matter. This condition keeps the boy from having the proper interest in his work, and therefore he goes about it mechanically, not thinking of a quicker and better way to do the work. This condition, taken with the social condition, causes the young man to wonder if there is not a better place than the farm.

There has been another very important factor in the deportation of boys from the farm. This one was the school. The time has been when the farmer was afraid to send his son to school any place except to the rural school, for he realized that sending the boy to school meant not only losing his work while in school, but in a majority of the cases lost him for all time. The boy, when he finishes school, feels that it would be degrading for him to go back to the farm, for he has not been taught to make a farmer but to become a president. Now this was an erroneous teaching; good farmers, good professional men and good business men are what we want; for out of these the presidents come. Besides this he says: "What is there back at the farm for me?" There he can't enjoy a baseball game for farmer boys can't take the time to play ball or to entertain themselves with some other wholesome sport or game. The boy takes all this into consideration and without thought of the distant future he goes to the city seeking the pleasures that mean so much to youth and young manhood.

We are glad to know that this school problem is fast fading away, and the time is dawning when the farmer will send his boy to school in order to make him want to return to the old farm where he can do good by making the farm and farm life what it should be. This happy condition is coming with the agricultural high school and college which the deep-thinking men of today are boosting, voting for and promoting in every possible way.

HOME ECONOMICS IN THE SUMMER SCHOOL.

By MISS MARY DON EY, Summer School, '13.

In the Summer School no course was more popular than the Home Economics. The University is well equipped for giving instruction in this subject, but the demand for the work was greater than had been arranged for.

The classes in Domestic Science were so full that another division was made, and yet all in the first class could not work at once.

The teachers were earnest and capable, and gave us only that which would help in the work of presenting the subject to classes. They were especially kind in giving special lessons on subjects asked for by a majority of the class.

Cooking on a fireless cooker was new to some and was carefully explained and demonstrated. Serving was also carefully studied. The theory of pure food and its preservation was dwelt upon, as was the composition of the various foods and the ideal diet.

Many in these classes also took general chemistry to help them understand the question of cooking better. This is the wisest way to fit oneself for a thorough study of food and its digestion, since many of the changes effected are chemical.

The course in Home and School Sanitation, conducted by Prof. Ferris, Prof. Mulvania and Prof. Switzer, was the opening of a new phase of Home Economics to many, who had not thought of the prevention of diseased conditions by proper sanitation as a part of the economy of the home.

Still another phase was presented by the teacher of sewing, who instructed those enrolled in methods of presenting the subject to classes.

The students were required to learn the various stitches, make patterns and cut and make garments. Their work in many instances showed much skill and care.

The various exhibits owned by the University helped to make the work attractive. One of these was the silk exhibit, showing the method of raising the worm and the manufacture of various grades of silk material. Another was the wool exhibit, and still another was the cotton. The pupils were taught to distinguish the various kinds of materials used.

The Domestic Science pupils learned much from the charts displayed in the recitation room and the articles arranged on the bulletin board. The library provided especially for this department was a source of much information and pleasure to those who availed themselves of its opportunity.

On the whole a more practical course could scarcely be planned, and from the earnest work of those enrolled I am sure they were there for the sake of getting practical results in their work during the coming year.

One who did not take these courses cannot understand why all the pupils were so enthusiastic, but a knowledge of the subject and acquaintance with the enthusiastic instructors is sufficient explanation.

Tennessee Hall is a large, airy building and made a splendid home for the work of this department.

The summer course could not be as thorough nor cover as much ground as the regular course, but it fulfills its mission so well that the wisdom of the scholarships given in this department will be seen in the increase of the teaching of Home Economics to the girls who are to be the future home makers.

We hope to see the time when every girl in Tennessee will be skilled in Domestic Science before attempting to manage a home.

FIELD SELECTION OF SEED CORN.

By J. U. GILMORE, '15.

This season of the year finds the modern farmer in his corn fields not only busy with the culture of the crop but intent upon procuring the best seed corn to be had for the coming year. Farm Demonstrators and various agricultural workers have infused into his mind the necessity of selecting the next year's seed from the field and not waiting until winter and selecting from the bin. They have proven to him how necessary it is to choose the ear from the healthy, normal stock rather than stand the chance of making a poor selection at the crib when he is rushed for time. He is then apt to choose an ear from a plant which was a poor specimen, just because the ear happened to appeal to him.

Let us consider briefly what should be searched for in selecting seed corn from the field. Primarily you should not select from a field where the variety is apt to be crossed with an undesirable type of corn. Certain physical appearances of the mature or nearly mature corn plant are to be observed.

A few of the most important ones are, viz.:

1. Adaptability to conditions and surroundings.

2. Vigor.

3. Height of plant and height and angle of the ear.

4. Uniformity and trueness to type.

5. Weight of ear. (Estimated).

1. Adaptability—plants should be adapted to the average soil conditions and should mature neither too late nor too early. They should be such as to make the best use of the climatic conditions prevailing.

2. Vigor—an uprightness in the form of the stalk, good color, a well developed ear and leaf showing a vigorous constitution in the plant.

3. Height of plant and of ear—Extremes are to be avoided, choose one of medium or average height. This applies to ear as well as to plant. Plants bearing their ears low upon the stalk, will, if chosen for as many as five generations produce plants on which the ears are at least one foot lower than when the selection began. There is the same result when ears are selected for height from the ground. Market conditions are favored if the ears point downward, and the market conditions of the ear can not be too strongly emphasized.

4. Uniformity—The plant and the ear should be uniform in the manner

of growth, height of plant and of ear, etc., and conformity to the type you have in mind.

5. The weight of the ear can be estimated mentally, and will necessarily have to be taken into consideration when selecting for high yield.

The vigor of the plant and the weight of the ear depend considerably upon the conditions of growth and a plant which is or has been more favorably located than another should be discarded in the selection or else a suitable allowance should be made for its advantages. Many of the large ears found in a pile or in a crib have gotten their size because conditions of growth were favorable to them. You may escape the danger of making a mistake here by selecting the ears before husking time hence making greater progress in corn improvement.

To get best results selection should be made before the corn matures, and all prospective stalks marked by tying a string onto them or by some other convenient method. The number selected should be at least two or three times as many as will actually be used for about half the ears from the selected stalks will need to be discarded for various reasons.

It is of course possible to select seed corn with a fair chance of good results when the corn is being husked from the shock, however many farmers do not cut the corn at all in the South but harvest directly from the stalks which are used later in the season for cattle pasture. When shucking from the shock the ear is yet upon the stalk on which it grew and this can be observed to see if the previously mentioned requisites are present.

Seed corn as soon as selected from the field should be given an opportunity to dry out thoroughly. Different methods of drying are in common use. One method is to hang fifteen to twenty ears together with coarse twine and suspend these from the ceiling of a well ventilated shed or room. If rodents are very numerous, the bundles may be hung down by wires. Another plan is to make a cage composed of small tiers of little cages about 1 ft. by 1 ft. by 2 ft. and the entire series covered with fine wire netting. The ears may be safely kept in here without fear of any injury from rats and mice.

A man's inventive genius, if he has any, and I believe that the farmer has his full share of this useful commodity, will generally find a suitable and convenient method of storing and drying seed corn.

When seed corn is saved on a large scale a special building is made use of, having a heating apparatus for drying the corn when brought in and to prevent any absorption of water during damp weather. Extreme variations in temperature is to be closely guarded against as the germinating properties of the corn are too often impaired if not entirely lost.

One of the most desirable places to store corn when only a small amount is selected is in an attic over a heated room. The corn, however, should first be allowed to dry all it will in an open shed or in some other well ventilated spot and then, before the freezing weather sets in, it should be placed in the warm room where it is to be kept over winter. The seed when used the next spring will usually be found to be in perfect condition.

If a farmer has as much as ten

acres which he usually plants to corn or even if he has less than this amount and perhaps wishes to grow seed corn for sale, he should plan to follow the well-known system of ear-to-row testing or selection. Obviously the most promising of the ears selected from the field must be chosen for this purpose. There should also be enough seed of fair quality left to make the season's regular planting.

The previously mentioned plan is only an advanced step in the field selection of corn and it is one in which noticeable results are soon obtained if the work is carried out painstakingly. Not all of the grains on the ear need be planted in the ear-to-row test. Kernels taken from the butt or tip of an ear are not apt to be representative of the ear and should be discarded. It is much better to make use of the grains taken from the middle part of the ear. One hundred hills or stalks can be employed in the work. This number will be sufficient if the ear is a lucky find and if you see undesirable qualities cropping out there will be less loss.

SOIL: THE RESTORER.

By JAS. L. ROBINSON, '15.

Among the old Greek myths is an account of a battle between the gods and the cyclops. The two sides were fairly well matched in the contest in natural bravery and prowess, with one exception; the gods, being supernatural or divine beings, hovered over their enemies and never became weary, while the latter, being mortal, would become exhausted by the exertions of the conflict. But when this occurred, the cyclops would throw themselves upon the earth and when they sprang to their feet again their strength would be restored to them and they could fight again with unabated vigor.

Though this is a myth, yet the principle by which the cyclops revived their lagging energies seems to hold good for the human race. When the stress and worry of everyday life in business and professional circles have used up his energies and frayed his nerves, man likes to retire to some spot far out in the country where he can once again rub up against mother earth, and mingle with the life and society that directly and unblushingly depends for its sustenance on the soil. Just as it furnishes food and energy to the awakening plants in spring, so does it provide strength for the body and hope for the spirit of the wearied man. Communion with the great natural out-of-doors corrects the distorted image he has formed of the relations of man in society and his character as an individual, and restores things and men to their true perspective of value. Old discouragements lose their importance in this corrected view of life, where the estimation put on failure and success is approximated much closer to their real values than that received by the thoughtless throngs.

Likewise in the social history of almost any nation we find a large per cent of the actual workers, the efficient

men around whom the cogs of business revolve, the men who in all avenues of life really do things, have come from the country. The fact that this is not *all* but a *large per cent* does not lessen the significance of the assertion, for it still conclusively shows that the cities can not meet their own demand for men of ability and must turn to the country for them. Cities seem to require a constant stream of new blood, fresh from the invigorating contact with the soil, to provide sinews that will stand the grueling pace. This constant drain on the life of the country population, taking as it does a larger part of the virile than of the listless element, weakens the country stock till it can no longer meet the demand for life. Having thus eaten out its own life a nation dies as naturally as does an individual when all the energies of life have been spent.

This leads then to the larger view of nations or successive civilizations. Viewing them in this light we see Egypt, Babylon, Greece, Rome, Spain, modern Western Europe, including America, for this last is one civilization as surely as was that of Greece though similarly divided into many distinct nations, have all arisen from a virgin agricultural population as the foundation. All of these except the last have used up the energy of the country about them including all the lands they could conquer and have become history. Perhaps no better illustration could be given of this than Rome. Though in our earliest records a small town her population then was essentially rural. As she grew and extended her dominions by conquest she consumed her own natural energy and was compelled to draw on the very regions she had overcome. Thus we see her extending her citizenship to one locality after another, and she never gave unless she was receiving, for to secure this citizenship the peoples must always come to Rome. By ever increasing the radius of the sustaining provinces she many times renewed her life, and even when conquered she took the life blood of her masters to revive her own energies for a last century of existence.

We know that in a physical sense the soil is a necessity in the plant's storing up of food, and thus to the existence of all higher forms of life. Only a very minute quantity of the elements of the soil are used by the plant in its growth, but its intimate association with the soil is no less necessary. In some similar though much more mysterious way, just as certainly if not so closely, is man dependent on the soil, not alone for physical life, which is trite, but also for the ambition for achievement. Not only every generation of plants, but every individual must spend its life in contact with the soil, while for the animal this is not required. Yet even man, who is the most independent of all, who can wander farther and stay longer isolated from the conditions in which his primitive forbears originated, even he weakens gradually and must go back to the earth for a renewing or invigorating of his life.

The nightingale soaring high in the air, pouring forth its love song in a flood of melody is at last compelled by fatigue to descend to the earth. Would we, then, prevent its ascent because it can not remain aloft? Since man can not permanently remain away from the soil, would we have him to

stay always on it? Looking back over the names of the men who have made history or those whose names have been inscribed in the world's hall of fame as a reward for their achievements we find the Cincinnati are few. It is true that much of this history had better have been left unmade, yet it seems to be an economic law of society that the cities draw vitality from the country. Does this mean, then, that this will always be carried to the extent of sapping the life of the country districts? We have in the "back to the farm" movement an effort to make use of man's need for the soil to counterbalance the call of the city; to exchange man for man instead of depopulating the country for the benefit of the city. To insure equity, however, the man given should be equal to the man taken. As this is not always possible we have other agencies working toward the keeping of at least a moiety of the ablest country youths on the farm. All the conveniences of travel and communication, all the labor saving devices of home and field, tending as they do toward rendering home more attractive, help to hold the youth. Then the scientific methods of present day agriculture, and facilities for obtaining a training in them have opened up a more attractive vocation for the man who wishes to farm. Perhaps these agencies will succeed in maintaining the vigor of the country stocks and insure a source for the supply to meet the demands of the city. If the means mentioned succeed in maintaining the power and ability of the country man and at the same time provide for the city's call, we have taken a long stride toward correcting the relations between town and country. When these relations shall have been perfectly adjusted a new lease of life will have been added to national existence, and the soil have come unto its own once more.

THE AGRICULTURAL EXHIBITS AT THE NATIONAL CONSERVATION EXPOSITION.

By JEHU L. HINSHAW, '13.

The season of 1913 has been very trying on the agricultural resources and farm products of the South, but notwithstanding this the exhibits at the National Conservation Exposition are very good. Perhaps the most noticeable effect of the dry season on the show is that there were but few exhibitors, there being only 65 different exhibitors in all. No doubt there would have been many more if the season had been more favorable.

In the contest for the best display from any one county in the Southern States, there were only 5 entries, all of which were from Tennessee, three being from East Tennessee, and one from each of the other divisions of the state. The premiums were large and there should have been a much larger number of counties in the contest. The premiums were awarded as follows: Franklin County, first prize, $1,000; Blount County, second prize, $500. Sevier County, third, $300; Shelby County, fourth, $200, and Roane County, fifth, $100.

Franklin County had a very large

number of varieties of field crops and vegetables. Everything was of good quality and the display was very beautifully arranged. There were fifty varieties of corn, all of which was fair in quality and true to type. There were also a large number of varieties of Irish Potatoes which added much to the exhibit.

Blount County had a very attractive exhibit. The small grains, grasses and clovers were good, but the corn, although there were a large number of varieties, was poor in quality and was badly mixed, lacking uniformity and trueness to type. The vegetable display was very good.

Sevier County had an exhibit that was very artistically arranged, the entire display being well balanced in every particular of the arrangement. The quality of the products exhibited in the display was of very fine quality; perhaps the best of any that were shown in the entire show. There were no grasses or clovers in the display and only few varieties of small grain. The corn collection was large and of fine quality, the samples were uniform and true to type and were very good for the season, but there were few varieties. The vegetable exhibit was good but lacked variety. There was a good lot of apples which added a great deal to the attractiveness of the whole display. If Sevier County had had the variety of products that Franklin had it would have taken the blue ribbon.

Shelby County had a large display, having the largest number of varieties of any county, but the arrangement was very poor and as a whole the quality was inferior. The vegetable display was very good, there being quite a good lot of potatoes and some very fine watermelons. There was a very small collection of corn and the bundles of small grain were poorly made.

Roane County had a small display, covering only one-half as much space as the other county exhibits. The quality of the products shown were fairly good, but the display could not compete with the other county exhibits because of its size.

There were only three entries in the contest for the best Individual Farm and Garden Exhibits, open to the Southern States. Mr. H. L. Jones of the Post Oak Island Farm, Knox County, won first prize of $75; Mr. J. H. Coleman of Blount County won second prize of $50, and Mr. Henry J. Kinzel won third prize of $25. The exhibits were all good.

In the contest for the best display of Irish Potatoes from a single county there were only three counties represented. Franklin winning first, Shelby second, and Sevier third.

The single entries of Irish Potatoes were good but lacked in the number of exhibits, there being only about two or three entries to each variety, most of the potatoes being grown by two men.

The fruit exhibit was very short. The season has been such that very little fruit was grown. There was a nice display of grapes. The apple exhibit was good for the season. Most of them were grown in Sevier County, and were inferior to the fruit usually exhibited from that section.

The display of Vegetables and Garden products were very poor, there being no entries in many of the classes and not over three or four in any one of them.

On a whole the Agricultural Exhibits were good and had there been a

good season, and the Exposition more extensively advertised there would have been one of the very best shows ever held in the South. We hope that another year there will be a much larger and better display, not only from Tennessee but from all over the South.

WE'LL ALL HANG TOGETHER.

By C. C. FLANERY, '15.

There are many things we dislike to do and a very few things we really enjoy doing. The average man dislikes to think for himself just as most citizens neglect to make personal investigations and form personal conclusions as to the merits of candidates for political office, so it is in every business, it is natural for the average man to go along with the current, happy if it leads him into pleasant places.

But the worst of all tasks that an individual despises to do is to co-operate with other individuals whom he would enjoy fighting against more than he would delight in co-operating with.

This is the task that confronts the farmer. And he who is so wrapped up in his own affairs as to believe that no one can help him better than he may help himself has a very primitive idea of what modern co-operative farming really means.

There has been a perpetual warfare in this country between capital and labor and a continual struggle between producers and consumers. Every war might have been averted and every struggle could have been lessened if men should have respected the ideas of other men. The whole question of international peace could be settled at the stroke of a pen if men and nations would hang together.

Thus far I have been writing as if we are not co-operating in this country or in other countries. This is the wrong impression. The word "co-operation" means a great deal more to the farmers than we suspect.

We who are advocating as much co-operation in the South as is possible are doing so because we believe in the South. For the last few years the agricultural workers have proven what the South can do. The South is making rapid progress. This is due largely to the fact that Demonstration is becoming a realization to the Southern farmer.

The following statistics of the average corn yield in the Southern States show what is resulting with this one crop:

	1890 to 1899	1900 to 1909	1910	1911	1912
Virginia	19.1	22.7	25.5	24.0	24.0
N. Carolina	13.0	14.8	18.6	18.4	18.2
S. Carolina	9.9	11.6	18.5	18.2	17.9
Georgia	11.1	11.5	14.5	16.0	13.8
Alabama	12.8	13.5	18.0	18.0	17.2
Louisiana	16.3	17.5	23.6	18.5	18.0
Arkansas	18.2	18.7	24.0	20.8	20.4
Mississippi	15.0	15.2	20.5	19.0	18.3
Total yields (?)	22.0	23.0	25.0	26.8	26.5

These gains may not seem very large but they go to show that the average farmer in the South is becoming a better farmer. Last year was a very unfavorable corn year in most parts of the South and this accounts for the slight decrease shown.

The movement for co-operation first started in Ireland and the densely populated districts of England and has spread until now the farmers of Germany, Holland, Denmark and particularly all of the best farming countries are co-operating for mutual good. In Glasgow the biggest bakery in the world in run on the co-operative basis. It supplies the co-operators in Glasgow and its suburbs with their morning loaves. The second largest bakery in the world supplies the co-operators of Vienna. The biggest bakeries in Belgium belong to co-operators in Brussels and Ghent. The same co-operators have formed themselves into societies which conduct farms, dairies, slaughter houses, etc.

Co-operation has done enough for the farmers of Belgium and other countries that they can say that within its own domains co-operation has completely sterilized trade of all fraud.

The co-operative movement plan is purely constructive. It does not set out to destroy capitalism, but the fact must be recognized that, as co-operation becomes established, so capitalism must wither. The life of capital trade is absolutely dependent on the support of the people as consumers. If the people gradually build up a new source of supply outside of capitalism, superior to it, then capitalism must decay, die of starvation, necessarily it will be the capitalist who will attack and the co-operator who will be in a defensive position. The co-operator neither seeks nor avoids this struggle; he goes on building. If co-operation is superior to capitalism it needs no *upheaval* to establish itself; it will be established through its own inherent power, its fitness to survive the struggle. And that struggle must so far as possible be confined to the field in which the people have the advantage—the economic field. As voters we may be counted out, as workers we may be locked out, but as consumers the capitalist fears the power of every one of us. In that field there is universal suffrage; we all consume, from the baby just weaning to the old grandmother, on the milk of the one and the tea of the other there is a profit indispensable to the capitalist system.

THE EDUCATIONAL EXHIBIT OF THE COLLEGE OF AGRICULTURE AT STATE AND COUNTY FAIRS.

By E. F. ARNOLD, Special.

The agricultural department of the University of Tennessee has prepared for the farmers of Tennessee an exhibit containing information on all phases of agricultural life. This institution has parted with the old method, and wisely too, of showing grains grown under exceptional weather and soil conditions. The exhibit is not an array of what the Station has or can

produce in the way of prize winning farm products, but rather the setting forth of facts and results obtained after years of careful research and experimental work, that will help the man between the plow handles. It is practical to the core and designed to help the ordinary farmer of limited means and opportunities of securing information along the line of his life work. This exhibit is in no way a competitive concern for prizes. It is solely and exclusively for the development of the farming industry of the state. The exhibit has been prepared in duplicate and is now being carried to the fairs in all sections of the state and will be brought together in full at Franklin in October. In fact it bids fair to become a "traveling information bureau" on wheels to be rolled to the threshold of the farmer and there lay before him the error of his way and leave with him farm methods that will lighten his labors, increase his yield and add to the loveliness of his home.

In short this exhibit is composed of twelve large illustrative charts setting forth as many graphic lessons in the removal of soil fertility, seed selection, cotton growing, hay yields, beef production. and dairying. They show a marked contrast between the common and the up-to-date farm practices. For instance the chart on dairying shows that thirty cows like the five best cows at the experiment station will produce twice as much as thirty like the five poorest cows. This shows what may be done by grading up the herd. The chart on cotton seed selection shows that by seed selection from prolific stalks the yield was raised from an average of two oz. per stalk for entire field to an average of 9 oz. per stalk for an entire field of same size. This I hope will be sufficient to give the reader an idea of the nature of the charts.

The grain show will consist of varieties of wheat, oats, barley and rye in connection with a display of every variety of soy beans. These are designed to aid the farmer in selecting his grain and hay crops. Among the grains will be found hulless and beardless barley, both of which are recent achievements in the field of agriculture. The beardless barley was originated at the Tennessee Experiment Station. These two features of barley have for many years made it objectionable as a stock food but thanks to scientific agriculture. They are removed. There will also be a group of twelve or thirteen growing cover crops; oats, wheat, barley and rye for grain cover crop; crimson clover, red clover, sweet clover, Japan clover and alfalfa for legume cover crops; the mixtures for cover crops will be crimson clover and oats, tall oat grass, sweet clover, and alfalfa, wheat and hairy vetch, and barley and hairy vetch. They will be arranged on a level so the farmer can see and select for himself the crop that offers the solution to his own individual needs.

The fruit growers I am sure will be delighted with, as well as profitably informed by, the exhibit of Prof. Chas. A. Keffer's fruit. In this he shows quite a number of varieties of apples, peaches and grapes; the apples are packed so as to illustrate proper methods of packing for the market from which may be obtained an excellent lesson in apple crating. There will be a peach tree and some grape vines in connection with which will be pro-

per kinds of spray and solutions for spraying. In connection with this part of the exhibit Prof. Bently will have a large collection of "economic" insects with prepared insecticides for the eradication of same. Herein lies the secret of successful fruit growers, that is, knowing the life history of these insects and the methods of preventing or eradicating them. It is of vital importance, that every man that has fine fruit trees enough to supply his home should know something of their care and culture.

The soils and fertilizers as gotten out by Prof. Mooers promises to be one of the most interesting features of the exhibit. It will contain vital information to every farmer in the state of Tennessee. It will consist of illustrative lessons in soil treatment of the three grand divisions of the state, East, West and Middle Tennessee. The value of lime, potash, phosphate, nitrate or soda, and stable manure will be shown in their relations to the different types of soils in the different sections of the state as affecting the crops grown in each particular section.

This is the first attempt of the Experiment Station to reach the farmer by means of exhibits at state and county fairs and is another good illustration of their aggressive work in behalf of the farmers of the state and a profound testimony in behalf of their sincerity and loyalty to the commonwealth. This exhibit presents unmistakably the most convincing and at the same time the most needed lessons that were ever offered to a thinking public. They are designed to meet the needs of the average farmer. The institution could undertake no greater task or nobler work than to teach the farm boy, who is to feed and clothe the world, to grow two blades of grass where his father grew one. The Experiment Station is forging ahead and doing its part mainly toward the development and betterment of agricultural conditions in the grand old Volunteer State under their handicapped financial conditions and it is high time that the farmers are waking up to their needs and possibilities and rising up in one solid phalanx and demanding of their legislators an appropriation that will enable the institution to carry its exhibit not only to county fairs but to every hamlet and village in the state from Carter to Shelby.

BREEDING AND IMPROVING OF WHEAT.

By G. E. SHELBY, '14.

In wheat breeding experiments the principal objects have been to increase the yield, improve the quality of grain, and to isolate a strain or variety best suited to the conditions of certain sections of the country.

Since wheat is largely a self-fertilizing plant it is a comparatively simple matter to develop a variety or strain after you have once discovered it, for there is little cross-breeding and the progeny from an individual plant will generally breed true.

There are three methods in use in improvement of wheat; mass selection, individual selection, and hydridization and individual selection combined. Mass selection was the

first method generally used. It is simply the selection of those heads that most closely resemble the type or ideals you have in view, and then planting the seeds on a common plot with no regard to the individual heads. The trouble with this system is that you can never tell whether the fine appearance of the individuals was due to a favorable environment or to inherent qualities. Since acquired characters are never inherited those heads whose good appearance was due to an exceptional environment always revert back to their type when the environment is removed. Consequently this method has failed to bring about any appreciable or steady improvement.

Improvement by individual selection is now the most common method practiced by the experiment stations and scientific plant breeders. It differs from mass selection only in that each individual head is planted to itself. By this means the characteristics and qualities of the progeny of each individual head can be easily and accurately noted from generation to generation. When the progeny of an individual head begins to give proof that it will not breed true or can not improve the average of the variety it can be easily discarded.

The following, taken from Nebraska Bulletin 125, will give one a fair idea of the methods and results of improvement by individual selection. The experiment was conducted with the purpose of isolating a strain of Turkey Red Wheat that would better suit the conditions of Nebraska.

"As a foundation stock one thousand heads of Turkey Red Wheat was selected in 1907. About twenty grains were secured from each head and each head planted separately in short rows. The product of each head was kept separate and was in turn tested out separately from the others. The tests in these rows were carried on three years before deciding on which were the best strains in both yield and quality. At the end of three years the most promising strains are sown on thirtieth acre plots. From three to five years the wheats are kept growing on these plots, where very good comparison can be made of the yield and quality of the different strains. In all it takes about eight years from the time the selection starts from the individual head to isolate pure strains.

"However when one of these strains is isolated it is a pure stock and uniform in type for all its inherent qualities come from a single head."

These strains showed great variation in yield, resistance to lodging and shape and quality of grain. Some plots were almost destroyed by winds while perhaps another different strain adjoining it showed practically no bad effects.

In comparing the yields it was found that out of 26 strains selected, eighteen produced a greater yield than the check plats sown with the common field seed while eight produced less. In field tests by farmers in different sections of the state five out of twenty-one farmers who used the improved strains of Turkey Red reported a slightly decreased yield or no improvement when compared to their own seed, while 16 reported an increase. The average increase per acre of the 21 farmers amounted to four bushels.

In the third method where bybridi-

zation and individual selection combined are used, you cross two varieties of widely different characters. This was the method used to secure a winter wheat suitable to conditions in the Northwest. Previous to these experiments the farmers of Oregon had been growing two or three varieties of Spring Club Wheat as they had never been able to discover a winter variety that would withstand the vigorous climate of that region with any degree of certainty. However, during mild winters they had gotten a fairly good stand with winter varieties which yielded from 30 to 60 per cent more than their spring wheat.

In 1899 W. J. Spillman went to the Oregon Station and endeavored to develop a winter variety that would suit conditions there. Mr. Spillman had collected several varieties of winter wheat from different portions of the world that proved to be perfectly suited to the severe winter conditions, but was inclined to tumble during the wet season just before harvest. Spillman conceived the idea of combining these qualities of resistance to winter freezing and tumbling by cross breeding the Spring Club and Winter Wheat by cross pollination.

The first hybrid generation proved to have both the winter resistance quality and Spring Club appearance.

In the second generation these characters segregated after a regular mendilian fashion and broke up into pure Winter Club combination, pure winter, pure club and the hybrids between these. In all there were nine types. Four of these resembled the Winter Club, two the pure Winter variety, two the pure Club, one a long-headed winter wheat.

Since Winter Club was the strain most desirable, only those heads that resembled this character were saved, all the others were discarded. In the third generation the seeds from each plant were planted in separated rows and only those saved for further planting that showed no signs of breaking up into the various characters. By this method it required only three years to segregate a pure strain that would breed true Winter Club.

NEWS.

Mr. R. G. Briggs from Columbia, Mo., has been secured to assist Prof. C. A. Keffer in Horticulture this year.

Mr. A. S. Adsmond, '12, is traveling salesman for the American Ballast Co. At present he is located at the Conservation Exposition where he has an exhibit of Agriculture lime and concrete.

F. S. Harkleroad, '14, has been employed during the summer as keeper of dairy records and official milk tester at the Experiment Station.

L. P. Gabbard, '15, has been appointed as Laboratory Assistant in Zoology for the coming year.

The Southern Railway Scholarship to the University of Tennessee, which was left open from last year, has been secured by Wilford Weir, of Dayton, Tennessee. An examination was set but as Mr. Weir was the only applicant and as he fulfilled all requirements the scholarship was given to him without examination. This scholarship has a value of $1200.

THE U. T. FARMER

Scientific; therefore practical

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The weather conditions have been such this fall that in many cases crimson clover has failed, but because it has failed do not lose all the work you have done in preparing the seed-bed. By no means let this land lie bare, or with only a scattering stand of clover, all winter. Get a cover of some kind on it. It is getting very late to risk another planting of clover but there are a number of other crops for which there is ample time. Wheat, barley, oats or rye may be used, and these crops are as good for winter cover as clover, except that the former are non-legumes and therefore can gather no atmospheric nitrogen. As for the winter protection, the saving of the available nitrate and potash and the production of vegetable matter to make humus there is little difference between the legumes and non-legumes. If you cannot get the one you surely can get the other. Do not be without a cover crop for this would mean loss to you on every side.

Consider some of the advantages of the cover crop and then decide if you can afford to be without it.

1. The cover crop prevents surface washing during the winter.

2. It collects all the plant food that becomes available during the winter, which would otherwise be leached out or washed away.

3. It gives an opportunity for green manuring without losing the use of the soil for a whole year.

4. It leads toward the double crop system and crop rotation.

5. In case of legumes large amounts of atmospheric nitrogen is gathered and stored in the soil for use by another crop.

6. It keeps the ground in constant use, thus preventing serious trouble from weeds.

7. It gives winter pasturage at almost no cost.

8. It utilizes the growing weather of winter which otherwise would be entirely lost to the farmer.

9. It means more hay, more live stock, more manure, richer land, still more hay, etc., etc.

In some sections cover crop clubs are being organized. In order to be a member a farmer must agree to plant at least one acre of some winter cover crop. We hope that every farmer of Tennessee will consider himself a member of a Tennessee cover crop

club, a club which we hope will some day be organized and will plant at least one acre of some cover crop this winter.

The man who succeeds is the one who takes advantage of his surrounding conditions, whatever these conditions are. The farmer who constantly grumbles about the weather and the destruction by insect and disease is the one who fails. He soon decides that it is time wasted to try to combat these troubles, that farming is an uncertain business and that the "daily dollar" of the city means more rapid progress.

The past season has been just such a one as is apt to make the less thoughtful farmer dissatisfied, yet it seems that only the smallest amount of serious thought upon the matter should convince him, that, after all, he is the man least affected by the adverse conditions. The trouble is he looks at the "poor crop" and no further. The poor crop is on *his* farm therefore *he* is the loser. Is this true? Is not he, after all, the most fortunate one? If an individual farmer has a poor crop and the rest of the nation a good one we see how that particular farmer would have a right to complain, but is this ever the case except through the fault of the farmer himself? As a rule when the weather conditions cuts one man's crops short it does likewise with the other's. When crops are short, prices always advance. If there is a large crop of corn with a season market of 50c or a half crop with a market of one dollar per bu., who is the man to suffer most from the shortage; not the farmer by any means. The city man is the one who should most dread the spring frosts, the summer drouths and the severe insect and disease ravages. Let the farmer rest easy so long as he has a crop above the average, and every thinking man can have this.

We hope every farmer who is dissatisfied with his present condition and is contemplating going to town will consider the advantages he has over the city man before he takes the step. Many of the troubles which he now has can be remedied if only a small amount of thought and time is given. In case of early frosts use orchard heaters. In case of summer drouths—always be ready for them by using proper methods of farming. These methods have often been given in this publication, viz., use of green manures, tile draining when necessary, constant and shallow cultivation, and others. In case of insects and disease, use spray liberally. If you give your time to studying methods of improving your farming you will have no time, occasion or desire to grumble about our farm troubles. Get in a friendly spirit toward your work and it will be far more pleasant and profitable.

Messrs. Gilmore, '15, and McKinney, '16, report a very delightful and instructive summer's work at Clarksville, Tenn., where they were employed as field assistants by the Bureau of Entomology.

The Experiment Station is putting up some good exhibits at the various county fairs. These exhibits are in charge of Prof. C. A. Keffer and Mr. E. F. Arnold.

ALUMNI NOTES AND NEWS.

Mr. D. C. Parman, '11, resigned his position as Entomological Assistant in the Bureau of Entomology, U. S. D. A., on September 1, 1913. He has been stationed at Clarksville, Tenn., for the past two years of service, engaged in tobacco insect investigation. He left Sept. 4 for the west, where his wife is staying on account of her health, and where he will soon purchase a dairy and live stock farm and practice farming for a few years.

As usual, all the '13 graduates of the agricultural course soon secured good positions. They are located as follows:

H. A. Powers, professor of agriculture in the county high school, Lexington, Tenn.

H. P. Ogden, professor of agriculture in Montgomery County high school, Clarksville, Tenn., and County Advisor of Montgomery County.

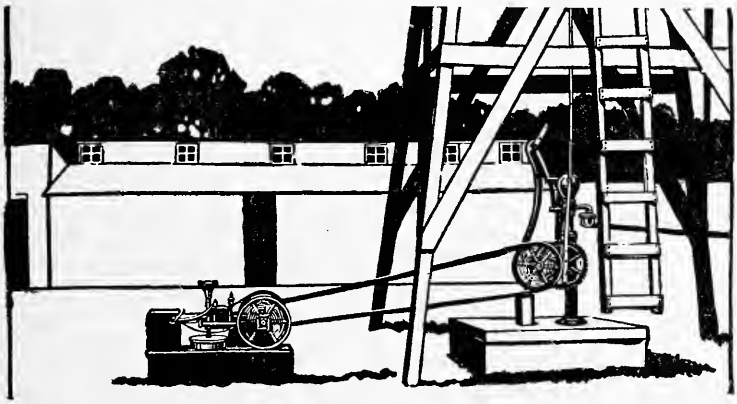
K. A. Neely is instructor in an agricultural school at Douglas, Ga.

C. A. Hutton is Assistant Dairy and Poultry Agent for the Southern Railway Co.

P. P. Hite is managing his farm at Gallatin, Tenn.

J. R. Titsworth is professor of agriculture and athletic manager at Brownsville high school, Brownsville, Tennessee.

J. L. Hinshaw has been acting as secretary at the Conservation Exposition. He expects to be permanently located soon.



Once Upon a Time

ONCE there was really no way out of it for the farmer. Plodding home from the field with his team at close of day, he saw before him the waiting small jobs about the house, barn, and yard, jobs that took time and labor, and never seemed to end. There was water to be pumped, wood to be sawed, various machines to be run by hand. But that was once upon a time. Today he lets the engine do it.

Every I H C engine is economical, simple, steady and reliable. Whether you want it for sawing, pumping, spraying, electric light plant, for running separator, or repair shop, or for all sorts of tiresome energy-wasting small farm jobs, you have need of an

I H C Oil and Gas Engine

I H C engines are built vertical, horizontal, stationary, portable, skidded, air-cooled and water-cooled; sawing, pumping and spraying outfits. Sizes from 1 to 50-horse power. They operate on gas, gasoline, kerosene, naphtha, distillate and alcohol. I H C oil tractors range in size from 12 to 60-horse power.

Have the I H C local dealer demonstrate the engine to you and explain its various points. Get catalogues from him, or write the

International Harvester Company of America
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THE

U. T. FARMER

TENNESSEE LIVE STOCK

Vol. VIII NOVEMBER, 1913 No. 2

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THE AGRICULTURAL CLUB

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KNOXVILLE

Contents

'Possum An' Taters

Talk o' turkey, breast so white,
Goose baked brown and sarved up right;
Smokehouse hams an' likes o' dat—
Streak o' lean an' streak o' fat;
Juicy backbone, steak on toas',
Mutton chops 'at some like mos'—
Sakes! they ain't a simmon blossom
To a big, fat Georgy 'possum!

Had one? Well, you jest kin bet!
('Pears like I kin taste him yet!)
Sarved up in old-fashion' style,
'Nough to make a parson smile!
Thar he lay an' graced the feas';
Sides jest gleamin' with the grease,
Brown an' juicy, crisp an' crackin'—
(Sally's lips was jes't a-smackin'!)
How they stared—them hotel waiters,
At that 'possum, dressed in taters!

Doctor—fust he made a start,
Carved that 'possum to the heart;
Sich a hurry fer the dressin',
Mos' forgot to ask a blessin'.
"Hol' up, boys!" he says, "the case
Is a fittin' one fer grace!"
But the words come sorter jerkin'
When he seen my mouth a-workin'!
(Comes to 'possum—'tain't no cheatin'—
I kin say grace while I'm eatin'!)

Doctor axed a blessin' prime:
"Now, Miss Sally, it's **your** time!"
Sally went to pass her plate,
But she foun' **mine** couldn't wait!
Warn't no **manners** there **that** day—
Struck her crock'ry jest half way!
Had the biggest kind o' laugh
When my plate come smack in half!
But that didn't stop the game—
'Possum got there jest the same!

Every appetite was willin';
'Taters sweet an' mighty fillin'!
Good old "yams" they raised last year,
Yallerer than Sally's hair!
(I could most eat alligators,
Cooked 'longside o' Georgy taters!
When they fix 'em up down South,
Melt like honey in your mouth!
Give a man a right **good** load,
Pay the last red cent he owed!)

Well! we eat that 'possum! I
Never seen Time gallop by
As she did at that 'ere feed,
With the 'possum in the lead!
Brotherin, this here ain't no fable;
When I drawed off from that table,
Felt that I was goin' to bust
Like the cotton baggin' trust!
But I **didn't**—as you see
No 'possum gits the best o' me!
—From "Songs of the Soil," by Frank L. Stanton.

The U. T. Farmer

Vol. 8. NOVEMBER, 1913. No. 2

THE BOY ON THE FARM.

By I. T. ELROD, Special.

The farm life with its close relationship to nature develops the greatest qualities of leadership in boys. Its work and influence plant and nourish the principles of body and mind fundamental in leading men. The boy nestles in the lap of mother nature which restlessly pants for growth and expansion. He is in a world of action and progress. This environment during the most alert stages of mental development vitalizes his latent powers of observation and learning. His life is shaped by nature. The trees, the flowers and the vegetation in their many different stages of development give him a grasp on nature's typical farms. The results of this unseen force creates new incentives for research and study which are the cornerstones of knowledge.

He observes that animals roam in herds guided by leaders; that birds move through the air in bodies, following leaders; and even the busy bee and ant move systematically about their work as if obeying definite instructions. All these more firmly convince him of man's need for wise leadership and fire him with a burning ambition to lead the ranks of men in the world's movements.

Modern inventions bring him in close touch with centers of activity and social movements and at the same time he is free from the demoralizing influences of congested population.

The singleness of farm conditions make him independent and self-reliant. The boy must in a great measure solve the problems of his own struggles and perplexities. He feels the need of toys and articles of amusement, but he does not have them. He is thrown upon his own resources and ingenuity to furnish them. This leads to aggressive work and independent thinking.

The necessities for the repairing of farm implements and machinery as well as the direction of their uses force him to use judgment and skill in common things.

A practical rather than a theoretical knowledge of soil culture and improvement is developed. The need of neighbors and improvement of general conditions are revealed to him, thus he must take hold of the practical, everyday things of his surroundings and work them out. This establishes confidence in his ability to lead.

The expenditure of energy and the sweat of toil over the plow and hoe develop muscles of iron and a will that knows no defeat. The congenial influences of his environment entwines his accomplishments and aspirations into a great power for moral and spiritual leadership.

The arduous tasks of the farm

weave the fibers of effort into invincible resolutions. All these expand the horizon of his conception and strengthen his grasp on the problems of life.

His mind and heart are opened to the deep voice of human needs calling staunch heroic leadership.

The little Virginia farm furnished the germ which gave to the venerable Washington the vision of a free democracy.

On the hill farm of South Carolina the Old Hickory of America found the inflexible will that marks the heroic victory of New Orleans.

The meager farm of Kentucky, together with that of Indiana, gave Lincoln, the great Emancipator, the firmness of purpose and the strength of leadership that gathered up the fragments of a bleeding and dissevered nation and bound them into the greatest power of earth.

COTTON AT THE WEST TENNESSEE STATION.

By A. G. THOMAS, '16.

The most important money crop in the South today is cotton. Only in the western part of Tennessee is it the main crop but all through middle Tennessee and the southern portion of East Tennessee it is raised by a few.

The leading cotton producing states are Texas, Mississippi, Alabama, Georgia and South Carolina. Until a few years ago Louisiana was in this list but the boll weevil has practically ruined the cotton crop there and it has also cut short the crop in Mississippi, Texas and Arkansas.

For large farms where labor is cheap and land good, cotton is the main money crop, but where labor is high and most of the land is owned by small farmers other crops are mostly used. Most of the cotton is raised by the negro share cropper or renter, while the land owner devotes his time to hay, corn and stock.

At the West Tennessee Experimental station, a great deal of attention is being devoted to cotton but on account of the short period in which the station has been in existence no bulletins on this subject have as yet been published.

Professor Bain of the University is carrying on some interesting experiments in seed selection but as yet has not reached as high a stage of development as he hopes.

About two acres, that was planted in oats which were taken off for grain in the spring of 1912, followed by cow peas which were plowed under and followed by a cover crop, heavily manured before plowing under, was planted in Trice cotton about May 6, 1913. The ground was thoroughly prepared and rows were thrown up with a middle buster. When the cotton was about three or four inches high it was scraped, chopped and the dirt immediately thrown back but most farmers allow the cotton to stand about a week or two before redirting. From then until the first of August six rows of this cotton were harrowed once a week, six

other rows were treated the same way except about the twenty-sixth of June a subsoil was run between the rows as deep as one mule could pull it; another six rows were laid by with a turning plow the middle of July. On the first of August crimson clover was planted between the rows but owing to dry weather it did no good. Where the subsoil was run the net gain was $6 per acre over the harrow only, and $12 per acre over the turning plow.

Where cotton has been grown every year the yield is so small that it does not pay for the work and where 200 pounds of acid phosphate and 100 pounds muriate of potash are used only 75 cents per acre is realized for putting on the fertilizer but where nitrate of soda is used the net proceeds over no fertilizer were $7.50 per acre.

The most serious fault in cotton is that unless there is sufficient rainfall to keep the ground moist enough to grow crimson clover or grain between cotton the land is at loss for a cover crop, therefore the land loses moisture and plant food, washes, and also packs; but corn and hay can be removed in time to plant a cover crop that can either be taken off for grain or hay or serve as a green manure crop.

BETTER SANITATION IN THE FARM HOME.

By LENA MILLS, Special

The sanitation in every home should begin with the choice and preparation of the building site, but in this article it is assumed that the house is built and occupied by people who are anxious to introduce better sanitation into their home.

The chief consideration will be ventilation, sunshine and cleanliness.

Proper ventilation means an abundance of fresh air, the ecsape of bad air and freedom from draughts.

The open fire place is of great service in ventilation. In each room, especially the bed room and the kitchen, there should be a cross current, i. e., a window raised from the bottom on one side of the room and one lowered at least six inches from the top on the opposite side. If this is impossible have one window open both at the top and at the bottom. In winter the discomfort of cold air may be avoided by placing a board or a strip of glass against the opening at the bottom of the window in such a way as to send the current of air up instead of straight across the room.

If there is a cellar it should have windows or doors on opposite sides and these should be large enough to allow the entrance of sunshine and fresh air. If they were built too small they can be made larger without much trouble. These openings should be fitted with screens which will be a protection against small animals and many insects. White wash and lime should be used abundantly in the cellar.

Cleanliness in the farm home too

often means hard incessant work on the part of the housekeeper. She should plan her work in such a way as to allow herself time for the recreations which she so much needs and deserves. Much time is spent in unnecessary detail. Most people can tell the difference between accumulated dirt and dirt which is incident to the day's work.

The kitchen requires careful consideration because it is where the food is prepared and there is no department of the household more important to the family welfare. Linoleum is a very satisfactory floor covering. It keeps out the cold, is easily kept clean and if cemented at the corners of the room and where two pieces come together it will be more sanitary than the bare floor. The cementing should not be done until the linoleum has lain on the floor about ten days and become "set" to the floor. In laying the linoleum have it come up about three inches on each wall, then fit it exactly after it sets. Use strips of cloth in cementing the pieces together. The walls and wood work should be painted with good light colored paint so they can be brushed down with the broom covered with a soft cloth or can be scrubbed with a stiff brush and warm soap suds. Most housekeepers will not allow dust to collect where it can be seen, so a good idea in kitchen shelves is to have the top one just on a level with the eye or have it inclined so there will be no temptation to pile dust catchers on it. Glass jars, tin cans and boxes are useful for storing many things in the kitchen. They keep out dust, mice and insects, therefore prove to be of much sanitary value.

Sal soda is an effective cleaning agent and should be used more in the home. It forms the basis of most of the patent cleaners and is much cheaper. Care must be taken in its use, however, as it will injure paints and varnishes and the hands as well. When used with a stiff brush it is invaluable to the housekeeper, especially where milk vessels are used. The need for clean, pure milk is so urgent that sal soda is a great boon to the farm woman. Its use is not to be limited to the kitchen for it has its place almost throughout the house.

The bathroom is often considered an impossibility on the farm because of the expense of plumbing and fixtures but with proper planning and a willingness to use ones hands, a very comfortable and inexpensive bathroom may be fitted up. A small room may be cut off on the outer wall. A very good tub may be bought at a small cost. If there is no plumbing, both the bath tub and the kitchen sink can be emptied by pipes into movable tile drains with open outlets. The drain should be frequently moved and the soil disinfected with lime.

The housekeeper in the farm home, since she is largely responsible for the health of her family, should ask herself the following questions:

Does each room receive fresh air and sunshine daily?

Is the well placed where there is no danger of pollution from surface waters? Is the milk safe?

What can I do to better the sanitary conditions in my own home and in my neighborhood?

POULTRY AS AN ADJUNCT TO FARMING.

By J. U. GILMORE, '15.

In the rush of agricultural development we hear much of that type of farming known as poultry raising. The attention toward this subject is rapidly increasing and wide-awake farmers are now seeing and taking advantage of the splendid opportunity to combine poultry with whatever type of farming they happen to be following. Is it a broad assertion to state that any farmer can arrange to profitably keep poultry? We are inclined to answer in the negative.

It is said that 89% of all farmers produce poultry. Thus we see that every type of farm has poultry on it, either as a side line or as a larger share in the investment. Men who know state that, dollar for dollar, money invested in poultry will as a rule pay a larger dividend than money invested in a dairy.

The farmer has few obstacles to overcome when he directs his attention to poultry raising. He must of course be informed as to the needs of fowls and how to supply these in the best and mose economical manner. He must be able to pick the breed best suited to the conditions of his farm and to the purpose for which he is raising them.

For the average farmer the best breed is a dual-purpose one, as the Barred Rock or the Rhode Island Red. It is unnecessary to mention that the cock is one-half the flock, and that even as a pure-bred steer makes better gains than a scrub, a well-bred fowl is a more economical producer of poultry flesh than a mongrel.

Too many farmers make the common mistake of letting their chickens forage, winter as well as summer. In summer time there is not so very much objection to this plan as in winter when proper care and feed must be given to the fowls to insure egg-production. Do not give chickens the open air treatment as allowing them to roost in shade trees and to have their combs frozen off, but have a clean comfortable well-ventilated house with all the time saving devices that you are able to install. A range on which fowls may exercise and pick is needed. A flock of 20 will not injure an acre in wheat, or oats during the winter time. A special series of plats of rye crimson clover, and alfalfa can be so arranged that the hens may have green feed the entire year. Corn is the usual food fed by the farmer to his flock, but as chickens require a nutritive ration similar to that of cattle, a small amount of roughage is required in addition to corn. Dairymen may very profitably dispose of their skim milk by feeding it to their capons or to layers.

In strictly egg-production the farmer must bear in mind that he will receive eggs in direct ratio to the quantity and quality of feed fed. Sprouted oats with shoots three to four inches in height are a cheap source of excellent green food. The farmer who has power on his farm

(as he should have) can easily grind his grain, green bones, and root crops for his flock.

The increasing of the flock should be considered. For a flock of less than 200, I would not recommend the use of an incubator, but with a larger flock an incubator would be really necessary especially when the grower sells broilers and capons in the early market. The caponizing process has been made so simple that the extra gains made by capons recommend it very strongly.

A few words on marketing poultry products. To begin with the farmer needs regular customers who pay extra for fresh eggs which will not crow when you open the shell. There are some hotels in Knoxville which pay 60 cents per dozen the entire year. Is this not an inducement for raising eggs of guaranteed quality? The dairyman has really the best chance to dispose of the poultry products and to the best advantage. With the aid of printed circulars, etc., he can easily inform his patrons that he is in the poultry business also and will be pleased to supply their needs in that direction. Co-operative marketing has its advantages as well as its disadvantages, some flocks may be on a strike while others can satisfy the demand, but this can be overcome to a certain extent by having flocks of hens which alternate in their strikes. One farmer by himself rarely produces enough poultry products to get in touch with a first class market, if several men market together this difficulty will be obviously overcome.

In conclusion I would say to the one who would raise poultry as an adjunct to any type of farming that there are no mysterious poultry secrets which you need to buy in order to succeed in the work. All the so-called "discoveries" and "processes" can be easily obtained from the Experimental Stations. It is not the breed, nor the feed, nor the house, nor the care, not any *one* or *two* of these factors, but *all* carefully applied that are necessary to success.

PACKING APPLES.

By JESSE SHAVER, '15

Apples are packed either in barrels or boxes; the package depending on the market requirements. In this as in all other fruits and vegetables, care must be taken to use the package in common use in your market. Fruits packed in containers of unusual size may go begging; while inferior fruit in the regular containers finds ready sale. The reason for this is that the retailer already knows what subdivisions the package is capable of and just what profit can be counted on; if this package is changed it makes necessary a new set of calculations which the retailer will not make. Certain sections lose valuable markets because they will not take pains to meet their requirements as regards package and grading.

The necessity of careful packing

is further shown when we consider the route it must travel to reach the consumer: First, is a haul of several miles to the railroad station; then a 50 to 1000 mile ride on the railroad; then more or less rough handling by the train crew; a haul over the rough city pavements to the commission merchants' store; an exposure of some time; another ride to the retailer; another exposure; and then another ride on the city streets at top speed to the consumer. Is it any wonder that fruits and delicate vegetables are not in the best of condition? Therefore, the greatest of care should be exercised, both in picking and packing apples, not to bruise them or injure their skin. It is best to pack into a padded basket, one of a half bushel size being most convenient.

The packing is generally done in the field under a temporary structure or packing shed. This usually consists of a tight roof placed on poles; the more air and sunshine admitted the better. Sunshine and air prevents the growth of decay. Some orchardists sort their apples at the time of picking; while others sort and pack theirs after all are picked; the apples being piled in bins under the shed until the time for packing arrives. Whether it is best to sort and pack as picked or do this work later will depend of course on the rapidity with which the picking is progressing; the nearness of cold weather; and other local factors.

In general apples are either packed in barrels or in boxes; the boxes being used only for fancy fruit. The barrels are used mostly, however, and will therefore be discussed first.

The barrels are placed on straw or a plank so as to keep the end clean for the brand; then the lower end is "faced." This is done by placing the bottom rows stem downward; then the other apples are poured from a sorting basket—a basket which will go down into a barrel and thus prevent bruising. The barrel is shook down several times during this process. When the barrel is full the apples should extend ½ in. to ¾ in. over the chime of the barrel; then a circle of corrugated paper should be placed over the apples; the head over this; and then be forced into place by a screw press. Then the hoops should be driven down and tightened and nailed. If a barrel rattles, it is not packed right and will bruise in shipping. Fancy paper covers over the top of the apples increase their attractiveness.

Now the barrel is ready for branding. It is very important to have the name and address of the grower and also the variety—which can be on the insert—on the brand. Branding is generally done with a stencil having an insert for the variety. If inferior fruit is shipped, ship without using your brand. In this way make your brand stand for something. The public knows that if a man puts his name and address on his goods, he is not ashamed of its quality and it is safe to buy such produce.

In some places fancy apples are packed in boxes, forty pound boxes being the ones in most general use. Many people will buy a box of apples who would never think of buying a barrel. It is estimated that three boxes will cost as much as a barrel,

and that by wrapping them with paper one barrel will make four boxes. Each one of these boxes will bring practically as much as a barrel. You can figure the profit.

In packing be honest; it pays. Also be careful not to mix grades. Some farmers and packers seem to be very unfortunate.; for all of nature seems to be against them. On some farms the laws of gravitation seem to be reversed and the large fine apples gravitate to each end of the barrel, while the small ones gravitate to the middle. Such men indeed are unfortunate.

THE CONCRETE SILO.

By C. A. HUTTON, '13

There are three forms of concrete silos: The solid wall, or monolithic silo, the hollow block, and the metal lath plastered concrete silo. Of these the solid wall type is probably the oldest and is the one in most common use at the present time.

The advantages of concrete over wood for silo building material are first, that it makes a far more durable structure, is not affected by wind, fire or drought. The fact that concrete silos have not been in use for a great many years makes it impossible to state with any degree of accuracy the durability of the concrete silo. We note from bulletin, Vol. IV, No. 6, published by the Extension Department of the Kansas State Agricultural College, that cement silos built in 1902 are still in a perfect state of preservation (1912). The authors state that the cement silo, when properly constructed, should last at least a lifetime.

Second, comparative cheapness of construction. In Bulletin 182, Virginia Agricultural Experiment Station, we find the following statement: "Concrete silos need cost but little, if any, more than the best wooden ones, while their period of usefulness is much longer." The cost varies with the type of silo. The Kansas Bulletin referred to states that where materials are excessively high the metal-lath plastered form is the cheapest, the solid wall comes next, and the hollow block is the most costly. Here in Tennessee, where materials are comparatively cheap, we believe that the solid wall type can be built cheaper than the metal-lath.

The average cost of six solid wall cement silos as reported in Bulletin 98, Na. Da. Agricultural College, is $365.39 for silos ranging in capacity from 87 to 143 tons, or an average cost per ton capacity of $3.13, while the average cost of 10 wooden silos ranging in capacity from 83 to 161 tons was $359.55, or an average of $3.32 per ton capacity.

The cost of a 150-ton concrete block silo built near Richmond, Va., was $289, or $1.92 per ton capacity. (See Va. Bul. 182). A solid wall silo holding 150 tons was built in Missouri for $244.40, or $1.63 per ton. This includes cost of steel frames, labor and all material.

The cost of seven solid wall silos as built under college supervision in Kansas ranged from $200 to $350, and the capacity of the silos ranged from 120 to 155 tons, or an average of $1.97 per ton capacity.

A third advantage of the concrete silo over wooden structures is the simplicity of construction. This applies especially to the hollow block type, but the solid wall type is no more difficult to construct than is a "Wisconsin" silo. The metal-lath concrete plastered silo is more difficult to construct, however, and requires the services of an expert to apply the cement plaster. This type is only used where the cost of material is excessive.

It has been demonstrated over and over again that just as good silage can be made in a concrete silo as in any other kind, if it is properly constructed. Cement has been objected to on account of the effect of silage juices, or acids, on the concrete. This can be overcome by the use of a richer mixture on the inside. Paints and coal tar applications do very little good, because they soon scale off. (Va. Bul. 182). A better treatment is to give the inside wall a "painting" with cement mixed with water, applying it with a brush.

RAISE SHEEP.

By T. H. DOUGHERTY, '14.

Not enough sheep are raised in Tennessee. We wonder why this is true when there is so much to be gained by engaging in this industry. We believe the reason for the absence of sheep on so many farms in Tennessee is the lack of knowledge of this wonderful animal. Give the command "Raise Sheep" and every letter in the two words will suggest a reason:

Returns are quick.
Adapted to most parts of the state.
Income at time when most needed.
Soil is improved.
Eat obnoxious weeds.

Small capital is required.
Help utilize rough ground.
Easy to sell.
Every one is profitable.
Pleasure to the owner.

There is no animal (poultry excepted) on the farm that will give as quick returns on the money invested as will the sheep. The sheep is a dual purpose animal yielding an income twice a year. The ewes should drop their lambs about the first of March, and the lambs are ready for the market about the middle of June. From February till June the greatest amount of feed and attention is required. From the time the first nickle is spent on the lamb until it is sold is less than four months. What other animal returns the money as quickly? Of course, the flock requires some expense and care all times of the year, but this cost is very small compared with the lambing season, and is more than covered by the price of the wool, which is sold in May.

That sheep are adapted to most parts of the state is proved by the fact that they are successfully grown in all sections of Tennessee. From the standpoint of soil, climatic and pasturage conditions, no section of the country could be better adapted to sheep than East Tennessee. There are large areas of rough land entirely unsuited to cattle that could be profitably used for sheep. The land is high, well drained, comparatively few fever parasites, and has excellent grazing conditions. While the eastern part of this state is best adapted to sheep, they can be successfully grown on any dry land where there is plenty of grass.

As we have already mentioned, the wool is placed on the market in May and the lambs in June. This is at a time of year when nothing else is being sold off of the farm, hence a hard time for the farmer to get money. The money received for the lambs helps to cultivate and market the other crops. It carries the farmer through the tight part of the year.

As a soil improver the sheep is unequaled. Sheep droppings under like conditions contain a larger amount of fertility than that from either the horse, cow or hog. One of the desirable features of this product is the uniform distribution made by the sheep over the land. If there should be any unevenness, the greatest amount is deposited on the highest ground, where it is most difficult to apply barnyard manure. The sheep as a soil improver has been recognized for centuries by England, Scotland, France and Germany.

Where farms are infested with obnoxious weeds the sheep is especially valuable. Sheep will eat almost any non-poisonous plant that grows. For this reason they are well suited to woodland and thin soils. They are especially fond of weed seed, and no seed ever germinates after passing through a sheep. Sheep seek the ripe fruit of the bull nettle as one of their choice foods.

One of the advantages of the sheep industry is in the fact that a farmer can own a good flock of sheep at a comparatively small outlay of money. Twenty-five sheep is a very good sized flock for the average farm. This year good grade ewes could have been bought for $4.00 each. A good registered ram can be bought for $15. A ram and 24 ewes would, therefore, cost $111.00, which is less than the cost of four yearling cattle.

The fact that sheep can be raised profitably on land too rough for cattle, horses, or hogs, makes them especially valuable in the mountainous section of East Tennessee. There are rough areas on farms all over the state. These lands could be profitably utilized in the production of sheep.

Perhaps less experience is required in marketing lambs than any other animal. They are always easy to sell. The price received for a lamb in the large majority of cases is only a question of weight. The price per pound is uniform. There is a general weighing day in the community about the middle of June, the lambs are sold, and the check received at the scales.

But the farmer wants to know if he can expect a reasonable annual dividend. The answer is, every

sheep is profitable. Any healthy sheep, no matter how common, will yield a good profit if given plenty of feed and care. Of course, the better the sheep the greater will be the income. The average cost of feeding a ewe for a year and her lamb three months is about $2.00. Taking the 24 ewes above mentioned and counting them an average of one lamb each (one should easily get thirty from the flock) we will have a maintenance cost, including the ram, of $50. Add $25 to this for interest on money and depreciation in value of flock, we have $75. The lambs, if properly cared for, should easily average 75 lbs. by the middle of June. East Tennessee lambs last year brought 7 cents per pound; 24 lambs would therefore bring 75x0.7 x24 equals $126.00. The flock should average 5 pounds of wool. The wool would bring, at 25c, 25x5x.25 equals $31.25. $126 plus $31.25 minus $75 equals $82.25—net profit.

With these very conservative figures we have a net profit of $82.25 on an investment of $111.00. Will any other animal do as well? Any farmer who is willing to give to sheep the same amount of intelligent care that he gives to other live stock, will find them not only profitable, but good soil improvers, bringing into cultivation large areas of otherwise waste land.

Any profitable phase of farm life is pleasant, but sheep husbandry has a poetic attraction not found anywhere else. The history of sheep is so closely connected with that of sacred history that some parts of the Holy Writ is unintelligible without a knowledge of this animal. "He lay as a lamb dumb before his shearer," cannot be appreciated unless one has seen the innocent lamb helpless while the fleece of wool is being removed.

The farmer becomes attached to his flock because the sheep know him and recognize his voice. The lambing period is a happy time for the boys. Every boy loves the innocent baby sheep. No better way to make a boy satisfied on the farm than for the father to give him two or three sheep to claim as his own. There is a beauty and pleasure in raising sheep that cannot be replaced with any other animal.

Of course there is a great deal of detailed information necessary in connection with the sheep industry. Bulletin 223 of the North Carolina Experiment Station contains much valuable information for the prospective sheep grower. Other bulletins can be had from the U. S. Department of Agriculture. The farmer should avail himself of every opportunity to visit successful sheep farms.

THE MAKING OF ADVANCED REGISTRY RECORDS.

By C. M. HUME, '14

The invention of the Babcock test 22 years ago has revolutionized the whole dairy industry. It has given the dairyman means whereby he may weed out the unprofitable cows from his herd. And where formerly

a breeder need only know the number of pounds of milk a cow produced, now an accurate record of butterfat is demanded by the purchaser.

This has led the different breed associations to establish Advance Registry Records. Much has been said pro and con as to the value of such records, but with each year an increasing number of breeders are recognizing their merits. The following illustration serves to show the financial value of such records to stockmen. George Washington, a Guernsey bull from an imported cow, sold for $500. Six years later he sold for $3,500. The reason for this is apparent, when we learn that his dam had in the meantime been admitted to the Advanced Registry with 642 pounds of butterfat to her credit, while his sire had produced six daughters with records of 557 pounds as two-year-olds. This example has been duplicated in all the breeds.

The first tests were for 7 or 30 day periods, but of late these short-time tests have come into disfavor. This has been due to several causes, among which are the variations in the butterfat tests and the chance for the owner to produce an abnormal flow of milk for a short period. Thus the present method, adopted by most of the associations, has come into vogue.

In this method an official tester weighs and tests the milk for two days in each month. The milk yields for the remainder of the month are taken from the owner. Data show that almost as accurate results may be obtained by taking samples of only one day's milking. But the opportunity for greater accuracy with the two tests make it more popular. Inaccuracy in the milk records of some breeders has led to the suggestion that the milk yields as well as the butterfat records, be computed from the two day monthly tests. This will probably be the method used in the future.

But the question which comes to the dairyman is, how may I best prepare and carry on such a test?

In the first place, begin three months before the cow is to freshen. Especially is this true, if the animal is to have her first calf. Feed her liberally, and remember, that the growth of the foetus demands plenty of protein in the ration. Then the thirty days following calving call for the best of judgment in feed and care. These two periods are regarded by most breeders as being the most crucial. The milk production of the cow is influenced to an appreciable extent by the care and management given her at these times.

The ration of a cow on test should be made up of a variety of feeds of high protein content and of great palatability. Yet no definite rules can be laid down. The feeding of test cows calls for individual attention on the part of a reliable and thorough herdsman.

LIVE STOCK WEEK AT THE NATIONAL CONSERVATION EXPOSITION.

By D. T. HARDIN.

Live stock week at the National Conservation Exposition was without a doubt the most successful week of the Exposition. The weather was ideal and large crowds flocked to the fair grounds every day to see the excellent showing of live stock that were on exhibition. There were more than one hundred thousand people in attendance during the week. The largest crowd, more than 27,000, came out on Thursday, which was Farmers' and Homemakers' Day.

The live stock show as a whole was very good indeed, there being more than 1,500 entries, which was a great deal more than last year's records show. Though some classes were not as well represented as usual, others made a far better showing than had been anticipated. The night horse show was the most brilliant affair of its kind ever seen in the South. The best horses of Kentucky, Tennessee, Virginia, North Carolina, South Carolina, Georgia, and other states were entered, and when put together they made a very excellent showing. Though Kentucky horses took more than half of the prizes, they did not have as easy going as their exhibitors had expected. Tennessee, North Carolina, and South Carolina horses took a few blues and reds.

The biggest feature of the night horse show was the $1,000 Knoxville Business Men's Stake, offered for the best five-gaited saddle horse. There were nine entries, all of which were excellent saddlers, that would make one proud to own anyone of them. The judges found more difficulty in placing this class than any other in the show, but finally awarded first prize to Mary Yendall Fox, a beautiful Kentucky mare owned by Mrs. R. T. Lowndes of Danville, Ky. Second and third places went to Kentucky horses, while fourth and fifth ribbons were won by G. T. Florida, of Sweetwater, Tenn., and Homer Hamilton, of Knoxville, Tenn., respectively.

With a view to encouraging the production of heavier horses and mules in the South, the Exposition offered a prize of $1,000 for the best pair of draft mares on exhibit, same to become the property of the Exposition and to be sold at public auction on Friday of live stock week. The prize was awarded to Timmons and Jarnagin of Jefferson City, Tenn., on a pair of Percheron mares, while the red ribbon went to J. H. Blankenship of Knoxville, Tenn. At the auction sale the first prize winners went for $690, while the second prize pair brought $710. There was something wrong with the judging or the manner of selling. Several draft mares exchanged hands at the auction sale, bringing from $450 to $710 per pair, while a grade Shin mare was sold for $340. Timmons and Jarnagin disposed of a two-year-old at private sale for $350. This

is only a slight indication of how the draft type of horses are gaining in favor in the South.

Tennessee, though long noted for her Jersey cattle, has never before seen such a show. There were about 130 animals entered, all of which were from East Tennessee except one herd of thirty from Kensington Farm, Kensington, Ga. Local Jerseys took quite a hand in the winnings and especially did Island Home Farm and the farm of Geo. W. Callahan take the honors for Tennessee. Kensington Farm was represented by a herd that had won many ribbons already this year at Louisville, Ky., Memphis, Tenn., and Nashville, Tenn., but the competition was greater here than at any other place they had been this year. The aged cow class containing twenty very beautiful animals was the largest in the show. The decision was close, but Judge Groves finally gave both moneys to Mrs. Harry H. Galbraith, of Island Home Farm on Fox's Golden Dolly and Fox's Silver Tresses, both daughters of the bull, King Fox, one of the best bulls ever used in Tennessee. Mrs. Galbraith also took first, second and third in the junior bull calf class on sons of Loati's Noble. Mr. Callahan was awarded the prize for Grand Champion bull on a son of Devotion's Noble. There was little competition among the Holsteins, but Idle Hour Farm showed some very good individuals, though they were not in show condition.

The beef cattle, sheep, and hogs were about on a par with last year's show. All the breeds were well represented, but the competition was not as great as might have been. East Tennessee breeders also took a hand in these classes and especially among the Shorthorns, Dr. E. J. Foute, Mr. H. T. D. Wills, and Mr. Smith, all East Tennessee Shorthorn men, added much to the success of the show with herds. Giltner Bros. and Luce & Morley, both of Kentucky, won most of the Hereford ribbons, while F. P. Trumbull of Indiana came off with the big end of the Aberdeen Angus show.

The hog exhibit was good, but we missed Dr. Stanbery, of Newport, Tenn., with his Duroc-Jerseys. McKee Bros., of Versailles, Ky., took a large number of ribbons in the Duroc-Jersey show. By far the greater portion of the Berkshire money went to local breeders, while Mr. H. L. Currie, of Brownsville, Tenn., won in the Poland-China classes. Mr. P. P. Hite, of Gallatin, Tenn., carried off honors in the Southdown classes of sheep.

A special feature of live stock was the visit on Saturday of Secretary of State and Mrs. William Jennings Bryan. Though the live stock show was about over and the weather changing for worse, both Mr. and Mrs. Bryan were heard by large audiences. Mrs. Bryan spoke in the Auditorium in the morning at a mass meeting of the Mothers' Association, while the Secretary spoke from the marble grand stand in the afternoon, his subject being "The Making of a Man." Secretary Bryan was very much impressed with the wide scope of the National Conservation Exposition, and returned to Washington with the view of encouraging President Wilson to visit Knoxville and the Exposition before the close.

PREPARATION OF THE SOIL FOR WINTER WHEAT.

By J. B. BAKER, '16.

The importance of the preparation of the seed bed for wheat is not fully realized by most Southern farmers. They do not stop to take into consideration the fact that in the case of this crop all of the cultivation which is to be received must be put on before the sowing of the seed. The preparation of the soil for the seed bed largely determines the yield, and therefore the net income that is to be received at the time of harvest. If the Southern farmer would wake up to this fact the yields upon Southern soil would greatly increase. It is true that the Southern soil and climatical conditions are not quite as favorable as that of the North. Yet, if the Southern soils were well prepared before the seeding there would be a great decrease in the difference in the production of the North and South.

The time to start preparing the ground for winter wheat depends largely on the crop that has preceded. Wheat or oat stubble land, or other lands which are lying idle, should be plowed under in early or midsummer for the best results. Ground plowed in July gives better results than that which is broken in August, and that in August better results than that which is broken in September. The reason for early plowing is to destroy weeds and conserve moisture. Also, to give time for a more compact seed bed than that which is received by late plowing. The proper depth of plowing depends largely upon the character of the soil and subsoil. The usual depth, however, is from four to ten inches. Immediately after the ground is broken, the lower part of the furrow slice should be packed down so that it will not dry out. This can be done by means of a drag, roller, or harrow. After this it should be harrowed, off and on, until the time of sowing. Harrowing keeps the under layer of the soil compact and the upper layer loose and pulverized. In this condition the soil catches the heavy rains which fall during the months July, August and September, and retains them for the germination of seed and growth of the young seedling during the dry months October and November. In this case the young plant gets a good start and is better fitted to withstand the winter freezes.

Where corn, tobacco, beans, peas, or other summer crops have preceded, and where the ground is loose, it is sometimes cheaper and better to use the disc harrow instead of plowing. This pulverizes the soil on the top and leaves the under layer compact, thus aiding the young plant in getting early growth. The main object in preparing a seed bed is to have the soil below the seed in a firm condition and well connected with the subsoil, so as to supply moisture brought by capillarity to the surface, to the young plant. The mellow soil above the seed allows a sufficient circulation of air to sup-

ply oxygen to the plant and also favors the warming of the soil, gathering the heat through the day and acting as a blanket at night. It also conserves moisture, acting as a mulch to prevent the water from rising by capillarity to the surface of the soil, where it would rapidly be lost through evaporation. The mulch, however, does not want to be too deep. In this case the young plant would have to depend upon rains for its moisture and drouth and freezes would be a great detriment to the crop before the roots of the plants developed well.

When the land has a large amount of trash upon it or where it washes very bad it may be necessary to plow rather than harrow, even though the soil is in a loose condition. In any case, however, the clods want to be well broken up and the under layer well packed. Just before seeding, the ground should be disced shallow both ways and dragged once or twice, until the finest seed bed possible is obtained.

All other things being equal, early sown wheat has the advantage over late sown wheat. The early sown wheat gets a good start before winter freezing. However, the farmer must not be in too big a hurry to sow. It is better to sow a little late and have a good seed bed than to sow early on poorly prepared land. He must, also, guard against the Hessian fly. Whenever this pest becomes very numerous, the sowing of the crop should be put off until after the first killing frost. In this case the seed bed must be in extra good condition so that the seed can germinate and the young seedling can go right off to growing.

It is hard to say whether it is profitable to use commercial fertilizers or not. Many experiments have been made along this line, but very little satisfaction has been received. Sometimes they pay, but in the majority of cases they do not. An application of phosphate or a small amount of potash after the growth of a leguminous crop will pay a profit. Usually phosphate is needed more than any other element. A light dressing of barnyard manure sometimes increases the yield very greatly. Too much, however, must be guarded against, since it is liable to cause the crop to lodge before it matures.

WHY THE FARM GIRL SHOULD GO TO COLLEGE

By ADELA HAENSELER, '15

Just because mother and Aunt Sally did not go to college and yet made splendid farmers' wives and housekeepers is no reason why the farmer's daughter of today should not go. Mother had different conditions to meet than her daughter will have. She learned to spin, knit and cook, to care for her children and her simple household and that was sufficient, but the demands of today are greater. The social conditions are ever changing, woman's sphere is widening, and she must keep pace with her times.

It is no longer enough that she

be able to perform the simple household tasks, in an ignorant, imitative way. The farmer's work is rising from the job that every one-horse man can do, into the realm of a profession. He is being taught through scientific agriculture that there is more to farm life than hard work and a scanty living. The young farmer who grows up learns the whys and wherefores of all the methods which his father blindly followed. The girl on the farm needs this same elevating training. It will make her deem her lot as a farmer's daughter or wife as the best and noblest which could befall her. Her work need not be looked upon as a drudgery. There is no reason why she should not really love and enjoy it. Although there is much work on the farm and she must bear her full share if she manages right it should fall lightly from her hands.

In the South, especially, women need not change their ideas of work. The descendant of the wealthy slave holder must learn that it is no disgrace to take the broom into her own hands, and the poor woman must learn that her work is a noble one for which she need not feel herself beneath her sister who can afford servants. There is no better way of raising the ideals of the rural communities at large and the farmers' wives in particular than to send the girl from the farm to college. People may think the young girl is foolish to bury herself, as they think, from the world for four years, when she intends only to go back to the farm. She knows how to cook and sew and raise chickens. What else need a farm girl to know? It is true she could make out with this meager education, but she must keep pace with her educated brother in order to make a worthy companion and one who can appreciate his work.

The work at college, if she takes a Domestic Science Course, will help her to raise her ideals of housework; she learns to do the meanest task in a scientific way and it has a newborn interest. She learns the history of the little plants and animals which help or hinder her in her work. The making of bread, the care of milk, and the canning of fruits and vegetables are no longer merely hard work, but scientific processes.

But this training is not all that does her good; it is the elevating influence cast around her by her professors and fellow-students. The girl from the farm may feel the difficulties which naturally arise from her secluded life. She lacks the tact and social freedom which she observes in those about her, but it is just for this reason that she should go. She learns the ways of other people and can select those things which will be appropriate for a farm home and community. She need not try to ape her city friends, her farm life calls for other functions and other plans; but a season spent in a circle of city people can not but help her. The literature and art which she learns and even her foreign languages help to broaden her life. She has spent her childhood amid the beautiful scenes of nature and yet until she goes to college her eyes are dim. For

"A primrose by a river's brim
A yellow primrose was to him
And it was nothing more."

The birds and the bugs and even the horrid green worms are of interest to the college bred woman. She learns to see beauty in the minutest details about her. The full blood Jersey and dappled gray in her farm barn are creatures which she learns to love and admire. She takes pride in her flock of chickens and so, by casting her influence about her, she can make her own work and that of her neighbor a pleasure and delight instead of a drudgery.

There is no reason why the farmer's wife should be looked down upon. Her station only needs raising. She should go into the streets of the city looking as neat and trim as her city friend. The healthy sunburn of her face should be mingled with that refinement which comes only with study and pleasurable occupation. If her husband owns an auto and a fine estate she may already feel confident to meet her city sister on a social equality, and her daughters are looked upon as accomplished young ladies, but it is the wife and daughter of the poorer farmer who need the lift, and there is no better way to get it than to send the girl to college.

Of course daughter must take care that she does not demand too much from her parents. She must not expect her mother to put away her old fashioned dress and ways at once. She cannot take the reins from their hands and run their home the way she wants it. She must work gently, influencing and persuading them by degrees to try the "new fangled" methods. But if there is anyone who really needs a college education, not only for what it is worth itself, but for the good it can exert over others, it is the farm girl.

NEWS.

Professors Morgan and Keffer are attending the one-week short courses that the University is giving at different towns over the state. It was held at Elizabethton, October 13-18; Cleveland, October 20-25; Dayton, Oct. 27-Nov. 1; and the itinerary for this month is: At Crossville, November 3-8; Winchester, November 10-15; Gallatin, November 17-22; Erin, November 24-29.

The prospects for the Ag. Club look brighter than ever. Many new members have already been taken in and we look for a larger attendance than ever before. So it remains for each member to bring some one else to join, and let us make the Ag. Club boom, with every Ag. student on the "Hill" as a member.

Tennessee Compulsory Attendance Law.

We expect good results from the recent compulsory attendance law passed by the Tennessee Legislature. Last year North Carolina passed a similar law, and we hope it will not be long till the entire South follows this good example. For, after all, the real basis of improvement is more and better education.

The next issue of The Farmer hopes to discuss some phases of the rural school.

THE U. T. FARMER

Scientific; therefore practical

Published Monthy by the Agricultural Club of the University of Tennessee.

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Not until comparatively recent years has the problem of the farmer's education been thought worthy of the consideration and careful study of brainy men. But that the time for its solution was over due is quite evident when we consider what phenomenal strides have been made in the past few years, and are still being made, along the lines of Rural Education. So extreme has the enthusiasm been that our National Government, our State, and our thinking men are spending enormous amounts of time and money in coming to the assistance of the farmer, who until recently has been so neglected. The Rural Mail, which enables the farmer to keep in touch, daily, with the proceedings of the whole world; the highly improved graded schools; the elaborate Agricultural High Schools, and the specialized Agricultural Colleges, which give every farmer's son a fair chance to go as far along educational lines as he desires; the Extension Work, the short courses and "School on Wheels," which brings information to the very door of the farmer: these are a few of the things which indicate that the workers of this problem are really getting results highly favorable to the farmer.

What we must do now is to make the very best of these new institutions, use them in every way possible, so that they will not weaken and dwindle away from disuse. Almost everyone immediately took advantage of the Rural Mail and the improved Graded Schools; but the High Schools, Colleges and Extension Work have not been reaching the farmers as they are capable of doing. This is not the fault of the institutions, but rather of the farmers themselves, who think they cannot spare the time which it requires to get information from these sources. It is true that, in many cases, it is quite impossible for a farmer to send his son through high school and college, yet he can send him to some of the short courses that are held in various parts of the State—and it may be added here that, for the amount of time spent, more practical knowledge can be gotten at these Short Courses than

in almost any other way. There is now a chance for every farmer, poor or rich, to get at least a fair training in lessons on better farming and better living.

With this marked movement towards rural development we may safely look forward to a brighter future for the farmer; a time when the man behind the plow will have all the advantages of the city man in addition to that of being independent, which for so long has been his only claim.

Everyone who has an orchard on his farm should examine it for San Jose Scale, and if any are found the trees should be thoroughly sprayed in the early spring, February or March. For the advantage of those not familiar with this scale a very brief description follows: The scale is a small, piercing insect, covered with a dark shell, about one-sixteenth inch in diameter when full grown. The shell, as seen under a hand lens, is marked with a dot in the centre around which are several concentric rings. Under the shell is a delicate, pinkish insect which somewhat resembles a very small tick. It feeds upon the body, limbs and twigs of the tree; and as these parts are often completely covered by them, they can be easily found.

The affected tree should not be neglected until the pest is so abundant that a search for them is unnecessary. Make a careful examination of every tree and if any are found infected, begin the measures of control at once. The best remedy is thorough and timely spraying with a strong lime-sulphur solution made as follows: Slake, in warm water, twenty-one (21) pounds of good lump or quick-lime. When this is at the height of slaking, sift into it eighteen (18) pounds of sulphur. Put over fire and boil forty (40) minutes, stirring constantly. When finished boiling, add enough water to make straining possible, and after straining, add enough water to make fifty (50) gallons of the mixture.

Many fruit growers are frightened or driven out of the business by the San Jose Scale; largely because they do not understand the method of control, for of all the orchard troubles, this is one of the easiest to handle, provided a close watch is kept and the spray is used freely and at the proper time.

We have called attention to this matter early in the season so that the farmer will have ample time to inspect his orchard before the spraying season begins, and so that, in case the scale is found, he may make all necessary preparations for its control. We should also advise all fruit growers, whether they are troubled with the scale or not, to get the Government publications which deal with the subject, and study them, so that they may be prepared in case the pest should come.

The Farmer takes pride, and we are sure our readers and all interested rejoice with us in the recent and continued growth of our College of Agriculture. Almost all of the old students have returned; fifty new men are matriculated in

the Freshman year, and in addition to these there are a number taking the Special Course, most of whom will classify as regulars later. The Farmer wishes to be useful in making this growth permanent, because it believes in scientific farming; scientific, because it is practical, because it means "better farming, better business, better living."

We wish to call the attention of our readers to a recent publication, the "York State Rural Problems," edited by Professor L. H. Bailey and published by J. B. Lyon Co., Albany, New York.

This small book of 260 pages like all other of Professor Bailey's books, is carefully edited and interesting in every detail. In style it is simple, direct and forceful; in sentiment, inspiring and hopeful. He does not attempt to solve the rural problems for us, as some blood-and-thunder reformers would attempt; instead he puts before us some of the most vital problems to be solved and some of the most embarrassing conditions to be met. He goes further and points out the possibilities of reconstruction work through the re-direction of our present rural organizations.

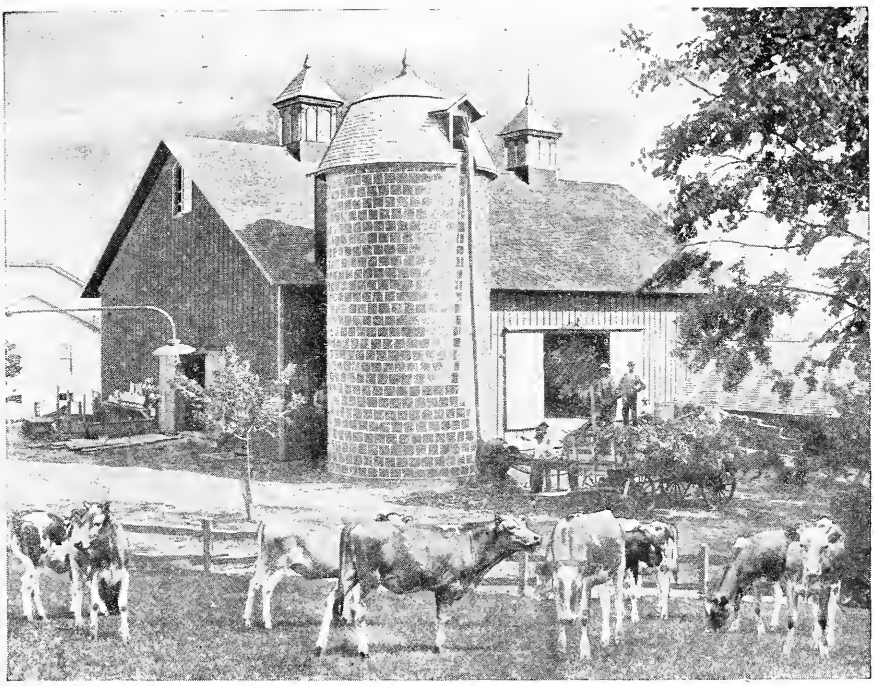
NEWS.

The National Conservation Exposition has now closed, with a great success as its result. It has not only shown the efforts and progressiveness of a working people, but it has also been a great source of instruction along agricultural and educational lines.

Professor Wilson had his advanced stock judging class attend the live stock show at the Exposition in order that they might study breed, type and characteristics as well as individuality. It was a great opportunity for the class to see and learn why the judges would place a certain individual first. Much could be learned from Professors Morgan and Jarnigan on the judging of beef cattle. Mr. C. T. Graves was all too glad to point out the fine and weak points of the dairy cattle.

If you are a student and didn't go to the "Big Ag." reception, you missed a treat. On the evening of October 11, the Agricultural Club gave a reception to the football squad at Morrill Hall, inviting the entire University. The second and third floors were beautifully decorated with autumn leaves, pot flowers and honeysuckle. Pennants lined the walls of the club room and hall of third floor. The officers of the club acted in the receiving line, giving everyone a souvenir as he entered. The souvenir was a card cut in the shape of a football with Agricultural Club written in big letters on one side and the name of the person was to be written on the other. Then everyone was ushered upstairs where he was made to feel at home. Delicious refreshments were served and several musical numbers were rendered. On the whole the evening was a pleasant one and everyone went home feeling glad that he came.

THE
U. T. FARMER



AN UP-TO-DATE SILO.
Courtesy National Fire Proofing Co., Pittsburgh, Penn.

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THE AGRICULTURAL CLUB
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UNIVERSITY OF TENNESSEE
KNOXVILLE

Contents

Thanksgiving

I thank God when I kneel to pray
That mine is still the middle way.

Set in safe and sweet estate
Between the little and the great.

Not troubled with wealth's cares, nor yet
Too poor, where needs that cark and fret

Push out sweet leisure and green nooks,
And give no chance for talk and books.

I take my middle way between
The mansion and a lodging mean.

My cottage at the country's edge
Hath sweetbrier growing in its hedge.

Honesty, hearts-ease, and sweet-peas,
Herb-bennet, love-in-idleness.

Give me a tree, a well, a hive,
And I can save my soul alive.

And be as poor in spirit as
The Poverello's lady was.

I covet not smooth silk nor lace
Nor any lovely lady's face.

Nor yet would go in hodden gray
But lawns and wool be my array.

I thank God that my modest place
Is set amid such pleasantness.

And not too high and not too low
The safe untroubled path I go.

Katharine Tyman, in *The Vineyard.*

THE U. T. FARMER

Vol. 8. DECEMBER, 1913. No. 3

WHAT OF THE SILO?

By C. M. HUME, '14

The question is often asked us, why does not the average Southern farmer make as much money as the average Northern farmer? The reason is obvious. The farmer of the South has not learned the real meaning of the word "conservation." Blessed with a wonderful climate, a long growing season, open winters, cheap productive soils and cheap labor, he has not been compelled by stern necessity to learn economy and thrift, as has his Northern brother. The result has been to deplete our soils and to turn some of our most productive soils into gullied areas. We have been extravagant with our feeding stuffs. Our first thought has been to glean from the fields, what we could most easily procure, while the remainder was allowed to become an almost total loss. Take for instance the corn crop. How many farmers realize that when they pull their corn, leaving the stalks standing in the field, that they lose 40% of the feeding value of the entire crop?

But the South is entering a new era. The eyes of her farmers are being opened, not alone to their short-comings but also to their wonderful possibilities. We are beginning to inquire how we may best conserve the soil and obtain a greater feeding value for our crops. This is the reason why silos are gaining in popularity through the South, for with a silo a farmer may save his corn crop with almost no loss.

The principal objection generally raised to a silo is "I cannot afford it," yet these same men are purchasing bran at $30 per T. and hulls at $10 per T. In an experiment, carried on by the Mississippi Station, silage reduced the cost of a gallon of milk 39% as against dry feeding. Then cannot we afford to build a silo, even after we take into account the original cost of from $2-$3 per T. capacity and the expense of from $1.50-$2.50 per T. for raising and harvesting the silage, when we save practically the entire 40% now lost and reduce the cost of a gallon of milk over 1/3?

"It is an ill wind that blows nobody any good" says an old adage; the truth therein expressed might be applied to the exceedingly dry summer just past. Farmers learned this summer by expensive means the value of rich land and the absolute necessity of making the most of their scant crop. Quite a goodly number of silos have gone up this year, even late this fall. These late built silos will be used for preserving corn stover, which is cut fine with a silage cutter and dampened with water before being put into the silo. Some farmers are putting molasses on this stover, as it is being put into the

silo. Good returns are expected from this method.

As to kinds, sizes and costs of silos, we cannot speak in this article. This is mostly a question for the farmer to decide for himself, for they will from necessity differ with individual conditions. But what we do urge is for farmers to investigate the merits of the silo, as we believe it is fast becoming one of the important factors in land and live stock improvement, which will make the South prosperous and happy.

GARDENING UNDER GLASS

By W. S. BALDWIN, '15

The North Carolina Experiment Station makes the point that market gardeners of the Southern states do not pay enough attention to this important phase of market gardening —"Gardening Under Glass."

Many of the market gardeners of the Northern states, especially of Vermont, have specialized on gardening under glass, until the North competes strongly with the South in supplying the winter vegetables.

If the Northern gardeners can afford to grow vegetables under glass, then, how much more profitable it must be for the Southern gardener, because of the simpler structure needed, the less coal required for heating, the absence of long-continued cloudy weather, and the greater abundance of winter sunshine.

A crop like lettuce, which is the most important and largest grown winter crop, must be grown, in the North, in hothouses, while in the South it can be grown in simple frames under loose glass sashes. This certainly is an advantage which Southern gardeners should not be slow to avail themselves of.

Of course, greenhouses are much more satisfactory than simple frames with glass, but the inexperienced gardener, or one with limited means may begin by using simple frames and after skill has been attained in handling frames, the transition to the green house follows naturally.

As previously stated, lettuce is the most important winter crop, so in order to be a successful winter gardener one must know how to handle this crop with perfection.

The following is a brief outline of how one of Knoxville's most prominent market gardeners, Mr. Emery, produces this crop.

Like most other gardeners he began first by the use of simple frames and sashes, but as he gained experience and as the demand for the crop increased he moved into a fairly well constructed green house, about 50x240 feet, heated by steam and watered by skinner system, (He is at present enlarging his greehouse to about double its former capacity).

The first preparation for winter lettuce is begun about September 20. Small boxes of the depth of about 4 to 6 inches are filled with soil that has been thoroughly mixed with well rotted manure. The lettuce seed are sown quite thick, about 1-2 inch deep, in little drills about 2 inches apart. These boxes are placed in

the greenhouse and kept at a temperature of 60° to 70°F. In ten days the plants should be about one inch high and have two small leaves at which time they are large enough for the first transplanting. They are then transplanted in similar boxes of soil, about 2 inches apart each way. In ten days or two weeks they are ready for the second transplanting. This time they are transplanted eight inches apart each way into the regular beds. These beds are made of good soil which has been finely pulverized to the depth of one foot and thoroughly mixed with well rotted manure.

In five or six weeks this lettuce is large enough for the market. It is cut and sold on the local market in bushel baskets, the price being about $1.00 per bushel. For shipping purposes, barrels are used. Ten bushels, eight pounds being considered a bushel, is placed in each barrel. The selling price of shipped lettuce is about $10.00 a barrel at present which is about the same as the price on the local market.

To show the value of this crop a piece of ground four by four feet square will produce one bushel. It is easy enough to grow four crops on the same piece of ground in one winter and spring, as lettuce is grown from 1st of October until middle of April, and only about six weeks time is required from final transplanting into the bed until it reaches maturity. So we see that each 4x4 foot square produces about $4.00 worth of lettuce.

In addition to the production of lettuce the greenhouse is used for growing radish in the winter; for starting tender plants like tomato, pepper, cabbage, etc., in the spring; and for growing of extra quality tomatoes and cucumbers during the summer.

In view of the increasing demand for good winter vegetables, lettuce in particular, the many other uses of a greenhouse, and the advantages the Southern gardener has over the Northern gardener, why should we allow the Northern gardener to compete with us and why should we not have more "Gardening Under Glass?"

THE NATIONAL DAIRY SHOW

By C. A. HUTTON, '13

The National Dairy Show held each year at the Amphitheater, Union Stock Yards, Chicago, has grown for the past seven years until it is now the greatest exhibition of the daily industry on earth. The building in which the show is housed is the largest structure in the world devoted to such uses, and cost $280,000.

The eighth annual dairy show just closed was the most successful one ever held. Here the visitor was shown the finest specimens of dairy cattle to be found in the U. S. This is the great round up dairy show of the season, where the prize winners from the various state fairs

are brought together for the final "battle royal." This year there were on exhibition 651 pure bred dairy animals of the following breeds:

Guernseys	183	head
Holsteins	176	head
Jerseys	135	head
Brown Swiss	67	head
Ayrshires	65	head
Dutch Belted	25	head
Total	651	head

Here one has an opportunity to study breed characteristics in a way that cannot be had at any other show.

In addition to the pure bred animals there were 29 grade cows, which were used in the various demonstrations. One of the most interesting as well as instructive exhibits was the grade herd of cows in the Government demonstration. These nine cows were fed and cared for in the most approved manner and each one was given a chance to make good at the pail, yet the daily record sheet showed that one cow gave a profit of 53 cents per day and returned $3.17 for each dollar's worth of feed consumed, while another cow under similar conditions lost the owner 8 cents per day and only returned the owner 62 cents for each dollar's worth of feed consumed. Lectures and demonstrations were given daily by officials of the Dairy Division on herd management, feeding, breeding, record keeping, etc.

Milking machines were shown and operated by three of the leading manufacturers, viz.: Sharples, B. L. K., and Empire. Each exhibit attracted its share of attention at the daily demonstrations.

The 40,000 square feet of floor space allotted to dairy machinery was filled to its capacity. The milk pasteurizing and bottling plant, operated by the Borden Company and the model creamery operated by the Blue Valley Creamery Company each attracted lots of attention. Throughout the entire exhibit of dairy and creamery machinery the one feature most noticeable was the increased attention to sanitary construction. All kinds and sizes of dairy and creamery machinery and utensils were shown, from a milk bottle to a pasteurizing machine, having a capacity of 25,000 lbs. of milk per hour.

This year there were sixteen colleges represented in the students judging contest and the three highets winners were as follows:

1st. University of Missouri.

2nd. Kentucky State University.

3rd. Iowa State College.

The educational features of the show can not be over estimated. There were twenty-eight organizations of an educational character represented at the show, representing every phase of dairy and creamery work. Addresses and lectures were given by the highest dairy authorities of the country on subjects of vital importance to every one interested in dairying.

Features of special interest to the lady visitors were the domestic science demonstration given by the Home Economics Departments of the Iowa State College and the University of Illinois. Here demonstrations were given in the use of

milk and dairy products in home cooking.

It was very gratifying to note the increased interest in the show by Southern dairymen. Georgia had the largest representation of dairymen from the southeastern states this year, the delegation from that state numbering about 15. Tennessee showed a large increase over last year, yet it must be admitted that Southern dairymen do not as yet appreciate the National Dairy Show as they should.

THE VALUE OF FIRST GENERATION CROSS IN CORN

By F. S. CHANCE, '14

When the white people came to this country they found some tribes of Indians who planted grains of corn of different varieties in the same hill. They claimed that by using different varieties they obtained a larger yield. The crossing of varieties in this way was, in a sense, lost sight of until Mr. Charles Darwin, of England, in 1876, published his classical work on self and cross fertilization in plants. Dr. W. J. Beal, of Michigan Agricultural Experiment Station, about the same time made some experiments in crossing varieties and his work proved quite conclusively that the yield could be materially increased by crossing varieties. In his work he also found that after the first-generation crop the yields seemed to decrease. However, the fact that after the first generation the corn seemed to deteriorate was lost sight of and people tried to follow up what seemed to be the most logical and scientific method of improving corn, which was to cross and then select from the cross to get a high producing strain. This proved to be the wrong road and for many years experimenters groped along in darkness, each finding for himself that no permanent results could be obtained by selecting from a cross.

Before going further it might be well to explain what is meant by the first generation cross. For example we will take say Hickory King and Cocke's Prolific; pure strains of each that have been selected for a number of years with no other variety mixed in. Take these and grow them in alternating rows and to force a cross we will remove the tassel from, say, the Hickory King rows. This will force a cross by there being no pollen from the Hickory King, therefore all the corn on the Hickory King stalks must be a cross between the Cocke's Prolific and Hickory King. This cross is used for seed the next year and from it the best results are obtained.

This method requires very little extra work and is practical for a small farm as well as a large one. If the farmer does not wish to raise this cross himself he might buy the seed from someone who makes the raising of the cross his business. That man at this time might be hard to find. If he is hard to find this would be a good business for more farmers to engage in.

There are certain points to be taken into consideration in making these crosses. The first and perhaps the most important is that all varieties do not cross to advantage. Another is that varieties which cross well at one place may not do well at another. For example, some crosses were made with two varieties in Maryland and some in California. It was found that in Maryland the cross was an improvement over either parent while in California it did not compare favorably with even the lower yielding parent. This may have been due to the fact that in the latter case the particular varieties were not acclimated. Experiments have shown that this has much to do with successful crossing. It is best to cross varieties as near home as practicable.

Now let us see if the increase yield will pay for the extra trouble and expense that it would cost to get the cross. The only way we have of determining this is by experimenting ourselves or see the results of other people's experiments. The latter is as a rule the cheaper. We will take the station closest to home that has done a considerable amount of work on crossing corn. This station is at Statesboro, Ga. There they crossed a number of varieties and over half of them were better than the best parent. The ones that mix well together are the ones we are interested in. We will say for example that we can increase the yield by five bushels per acre. It is easy to see what this would mean with corn selling at from eighty cents to a dollar per bushel. It seems that a margin like this should pay well for the extra trouble expended in production. This subject is well worth consideration and any one interested in it can get information by writing to their State Experiment Station or to the U. S. Department of Agriculture at Washington, D. C.

VEGETABLES IN THE WINTER DIET

By LENA MILLS, Special

During the winter months housekeepers, especially those who are at a distance from the market, often find it difficult to vary the diet. A great variety at one meal is not necessary provided foods are well prepared, but the same dishes should not appear often in succession.

Vegetables are essential to the diet for many reasons. Over-cooking renders them unpalatable and indigestible but if simply and well prepared they are both wholesome and delicious.

Cabbage is considered by many people to be very indigestible but if properly cooked it is one of our most valuable foods, since it may be had fresh when other vegetables are scarce.

A few recipes for cooking vegetables may be helpful to the housewife who has gone to her wits end to get variety into her winter menus.

Cabbage With Cream Sauce.

Cut the head of cabbage into four sections and soak ten minutes in cold water to which has been added one tablespoon of vinegar to each quart. This will draw out any insects which may be present. Cook uncovered in a kettle full of salted boiling water thirty minutes or till soft. Place on a dish and cover with white sauce made as follows:

1 cup sweet milk.
2 tablespoons flour.
2 tablespoons butter.
1-2 teaspoon salt.

Melt the butter in a sauce pan and stir in the flour. Scald the milk and pour it slowly into the butter and flour. Stir constantly, cooking till smooth.

Onions.

Onions are wholesome and nourishing but on account of the strong odor are best when cooked.

Remove outer skin and cut off ends. Put into sauce pan with boiling salt water; boil five minutes, drain, add more boiling salted water, cook one hour and serve with cream sauce as in the recipe above.

Scalloped Tomatoes.

Drain some of the liquor from a can of tomatoes. Season with salt, pepper and one-fourth teaspoon hashed onion. Line a buttered baking dish with bread crumbs, add layer of tomatoes then cover with bread crumbs and dot one tablespoonful of butter over the top. Brown in a hot over.

Tomato Sauce.

Cook one pint of peeled and cut tomatoes ten minutes, then rub through a strainer. Beat in a sauce pan until smooth and light one tablespoonful of flour and one generous tablespoonful of butter. Gradually beat the hot tomato into this, add the salt and pepper and cook ten minutes. This sauce may be served with macaroni, rice, etc., as well as with fish and meat. The flavor of the tomato sauce may be modified by the addition of onion, spice or herbs.—Farmer's Bulletin No. 256.

The discussion of vegetables in the diet could scarcely be complete without a few suggestions for their use in soups.

One is really surprised to find how many ingredients she usually has on hand for soup making. Such vegetables as potatoes, tomatoes, turnips, and onions make delicious soups. Rice, bread, eggs and milk make the soup much more nourishing. Beef or chicken stock improve the flavor..

Bean Soup.

1 pint of boiled shell beans, mashed fine.
4 quarts of water.
1-2 onion chopped fine.
2 teaspoonfuls salt.
1-4 teaspoonful pepper.
3 tablespoonfuls flour.
3 tablespoonfuls butter.
Boil twenty minutes.

Tomato Soup.

Cook together.
1 can of tomatoes.
1-2 pint of water.
1-2 pint of milk.
1 teaspoon salt.
Pinch of soda.
1 tablespoon sugar.
1 tablespoon hashed onion.

Thicken with 1 tablespoon of butter and 1 tablespoon of flour rubbed together.

THE FARM BOY'S CHOICE OF A VOCATION

By T. L. ROBINSON, '15

Should the Farmer's son Farm?

In dealing with the factors relative to the farm boy's vocation, perhaps the above question will first demand an answer. The reply to it is this: The farmer's son, or any other man's son, should follow that calling for which he is best suited by nature and in which he will thereby have the greatest amount of native interest; provided it be practicable to prepare him for such calling. Some farm boys are destined by nature for mechanical pursuits, others for social or clerical work, others for captains of industry, and so on.

Yes, the farmer's son should take up his father's business; provided that at maturity he may have both native and acquired interest in the same and that to a degree predominating any other native or acquired interest.

Impatience of Parents.

It would be better for the boy if all rural parents could realize the evil consequences of being impatient with their son in respect to his choice of a life work. Many a good boy yet in his teens is hounded and driven about by the continuous nagging of his parents, who ignorantly believe that he should have his future destiny all planned and ready for its realization. As a matter of fact, very few young men have any clear vision of their life's work at eighteen. Many of the great men were faltering and uncertain even as late as twenty-five.

In the usual case it is a waste of time to attempt to determine the boy's vocational life before he has gone at least well up through the intermediate grades of the common school. One of the great purposes of the common school course is that of sounding the boy on every side in order to find what there is, and to determine what he is by inheritance best suited to do as a life work.

Round Out the Boy's Nature.

The usual inclination of the rural parent is that of looking at his son's education too strickly in terms of dollars and cents. Such school subjects as language and composition are especially thought of as a useless waste of time. These subjects help to teach and awaken every side of his nature into its highest possible activity.

Now, while the growing boy's education should not be prejudiced in favor of any particular calling, there is no reason why the farmer's son should not be given the benefit of every possible relation to the father's work and business. That is, he must not be forced to take up the vocation of farming but given every opportunity to know its best meanings and advantages.

Again, there is a sort of drudgery and ugliness about farm work against which the boy's nature rebels, and it ought to. By this we mean to refer to the actual conditions of overwork and the accompanying run-down appearance that characterizes so many farm people today. Then, in order to maintain the most friendly relations

between the farm boy and the farm life, he should have an occasional outing. Participating in the grain and live stock judging contests and trips away from home occasionally will widen his scope of home environment. By attending sales of blooded stock he will learn to know more intimately the possibilities of animal husbandry. It should always be seen to that the boy's life is not so nearly dragged out during the day's work that he cannot spend thirty minutes or more of each evening at the reading table.

A Successful Vocation Certain.

Finally, it may be said that the successful vocational life of the ordinary country-bred boy may be guaranteed as practically certain, provided he has had every ordinary advantage of development and training of which he is capable. Train him early in lessons of obedience and work; make his life more wholesome through ample play and recreation; see that he learns how to earn money and how to save a part of his earnings; provide that he attend the public school regularly until at least the grammar grades be finished; give him an opportunity to become personally interested in the business side of the farm life; allow him opportunities to mingle with the cleanest possible society of his own age; and then await patiently his own inner promptings as to what line of work he should take up.

So, let the rural parent look ahead and formulate in his own mind the splendid vision of his son grown up to full maturity of all his best powers. Let the rural father attempt to think of his boy, not merely as a coming money-maker, but as a coming citizen; a man of power and worth and influence in the community in which he is to live.

THE IMPORTANCE OF THE HOME GARDEN

By O. M. WATSON, '16

The real home garden means a supply of fresh tender vegetables every day in the year; fresh flowers for the vases; all of the herbs for seasoning and garnishing that the family needs, and, in addition to this an abundant supply of fresh fruits during spring, summer and fall, and canned, preserved and pickled fruits for winter use.

It is surprising to know how few people realize the value of a real "home garden." Ask your friend if he has a garden and he will say "Yes," right away. "Pin him down" and you will likely find that his garden consists of a few onions, cabbage, radishes and beans in the early spring. By mid-summer the grass and weeds have taken possession. In late summer and fall, it is a good pasture for the cow and in winter it is bare, except for a few dead weed stalks that were too tough for the cow to eat.

From the standpoint of dollars and cents, the properly kept garden is worth at least $200 an acre to the family. From the standpoint of better living, the value of the garden

cannot be estimated. Who will undertake to estimate the pleasure that each member of the family will get by always having a supply of vegetables, fruits and flowers? It does not take a great deal of time, but a little time from day to day, just when it is needed, will accomplish wonders. Don't be content until you have a small orchard and a "real" home garden.

The women and children have to be depended upon to do most of the work in the garden, because the man has to raise cotton, corn, or tobacco so he can buy some canned tomatoes, meat and meal.

The garden should be located near the house because the work is usually done at odd times; so, as little time as possible should be taken up in going to and from the garden. If possible, the garden should have a southern exposure on land that is well drained.

The preparation should be deep and thorough; mix in the soil a large amount of well-rotted stable manure and have the soil well pulverized. The same preparation will apply to either flowers or vegetables.

Vegetables and flowers can be classified according to length of life as follows:

Annuals—or those that live only one season.

Biennials—or those which live two seasons.

Perennials—or those which have no definite period of life but continue to grow from year to year.

Perennial-rooted—or those which die above ground, while the roots send up new shoots in the spring. Asparagus is a good example of this kind of vegetable.

The perennial and perennial-rooted plants should be placed in borders or rows around the fence. The annuals should be planted in the middle of the garden.

Every home should be supplied with a good book on gardening, and also with the farmers' bulletins published by the United States Department of Agriculture and by the State Experiment Station. These bulletins can be had without cost, by writing to Department of Agriculture or the State Experiment Station.

Write for a list of bulletins—select what you want and write for them. They will help you make a "real" garden.

GROW CATTLE AND BUILD UP TENNESSEE SOILS

By W. J. FORBESS, Special

What can be more important financially to present and future generations than the preservation of the natural fertility of the soil with which nature has so bountifully blessed us?

Tennessee is an Agricultural state, one which depends upon the harvests of its fields for the wealth and happiness of its people. For these harvests to be what they should, the soil fertility must be maintained. We may talk as we like about good farming, commercial fertilizers and all

that; but it is not possible to preserve the fruitfulness of our soils without supplying sufficient vegetable matter. This can be done only by giving back to the soil in the form of plant roots, grasses and manure, what has passed in the process of cultivation. For the more we cultivate land, the quicker the humus is destroyed, and hence rendered incapable of giving to growing plants the fertility that remains. Vegetable matter is necessary to prepare soils to hold moisture, to withstand drouth, and to keep them in such physical condition that the plant's roots can use the plant food in the soil.

It is possible to maintain fertility of soils, and not only maintain fertility, but increase the productiveness by growing cattle on the farm and properly preserving and judiciously using all waste products. This has been done in Wisconsin and it may be done in Tennessee. A brief comparison of some statistics from the two states will show what may be accomplished in our own state. Wisconsin is compelled to put her cattle into winter quarters about the first of October while Tennessee goes into winter quarters about the first of November, or may be later. Cattle in Wisconsin must be well protected in expensive barns, and fed on rations stored away for winter feeding. Tennessee's cattle must be furnished only with open sheds and in many cases they are kept almost entirely unprotected on winter cover crops. It is true they must have grain rations and roughage for best results, but these are greatly reduced by good winter pastures that cannot be grown in Wisconsin.

Now let us look at some figures. In 1880 the average production of wheat per acre in Wisconsin was 23 bushels while in Tennessee the average was 16.2 bushels per acre. In 1910 Wisconsin's average was 30.4 bushels per acre while the average in Tennessee was only 19.1 bushels per acre. This shows an increase of 7.4 bushels for Wisconsin with only 2.9 bushels increase for Tennessee for the same period. Why this difference? The reason is clear. It is due to the number of cattle in Wisconsin. In 1913 Wisconsin had 2,680,074 head of cattle while Tennessee had only 996,529 head. This is a difference of 1,683,545 head. These were practically all dairy cattle. Tennessee has an average of 1 3-4 cows per farm while Wisconsin has an average 8 1-3 cows per farm. A dairy cow produces $30 in fertility each year. This difference gives Wisconsin $50,506,350 in fertility that is returned to the farm. If we will increase our number of cattle to equal that of Wisconsin's and suppose that a cow returns only $15 in fertility to the farm, we may add to the soils of Tennessee $25,253,175 in fertility.

There are some other statistics, that we wish to note, that encourage the growing of cattle. By the August figures of imports and exports of beef cattle and a comparison with the August figures of earlier years, we see that the United States has been transferred from the list of beef exporting countries to the list of beef importing countries. The report shows that our beef and beef cattle exports for eight months ending, August, 1904 amounted to $44,000,000 against $1,000,000 for the corresponding months of 1913; and the imports increased from 9,357 head to 340,105

head for the same time. In the whole year 1904 our beef imported for consumption was only $14,922 while for the single month of July, 1913 the value of our imported beef was $56,-993. In 1890 there were 588 beef cattle for each 1,000 people, in 1900 there were 589 for each 1,000, while in 1913 there were only 385 beef cattle for each 1,000 people. This shows there has been a great falling off in production of beef cattle as compared with the rapid increase in population.

The farmers of Tennessee must help reverse these unfavorable reports, otherwise their farms will become poorer every year and they will hand down to their children depleted soils—soils robbed of their natural elements—when they should leave them a heritage which nature intended to become more productive.

The demand for beef is greater than ever before, the population is increasing every year; and to meet this demand the Iowa Agricultural College estimates that it will take an increase of 1,000,000 beef cattle per year. Under such conditions there is no doubt but that cattle raising in Tennessee may be very profitable. The general farmer should keep on his farm enough cows, of the most desirable breed for his locality, to supply his own home with milk products, and to consume all the forage, grass and roughage that he may produce on his farm. These cattle will supply home needs, produce enough butter for market to pay for feed, and give direct returns as net profit from increase in cows, and sale of hogs fed on milk. The fertility of the farm will be greatly increased by the addition of barn-yard manure which supplies plant food, increases waterholding capacity and gives more abundant harvests. Greater yields of forage and fodder crops make it possible to keep more cows to give an increased supply of manure to build up better soils.

THE FARMERS' LINE TELEPHONE

By O. L. FARRIS, '14

Rural free delivery, good roads and a telephone line are three sure landmarks that are indicative of an up-to-date rural community. The free delivery is given by the government yet it takes some effort on part of the people to get it put through. Good roads are not usually forced upon the country people yet one section may appropriate money against the will of another and thus seem to force them to have modern improvement. But when we come to the third indication of a progressive community we can depend on it for although an R. F. D. and good roads are forced on people we have no instance where a rural telephone has been thrust upon a section against their will. To build a telephone line for miles through the country first takes a man who is a good organizer to get the neighbors together and "boost" the scheme, and second a community of intelligent, public spirited men, men who are willing to put their shoulders to the

wheel ana push together with all their influence and what cash there is needed. A decade ago there were very few such organizations of farmers in our state but now in most every civil district in all our counties we have party lines and are in touch with each other as well as the outside world. What was considered a luxury only a few years ago has now become a great necessity.

There are several methods by which a community can build a line but the most used is as follows: A meeting is called in which all the leading citizens take part, addresses are made and the subject is discussed pro and con by all. The meeting is adjourned with instruction for all to "talk telephone" to everybody and in all places. At the next meeting have some of the telephone officials of your home town exchange to come out to your meeting, which they will gladly do, and give you the details of expense and what kind of a contract he will give you. When it is decided to build a line, elect a president who is the best executive of your community and can handle business. Be sure that he is a man who carries the highest esteem of the whole section. Do not let trifle envies affect you in this selection. Then elect a secretary and treasurer who likewise is a man of good business abilities, for he must sign all contracts and transact most of the business for your "company," for now you have really a "telephone company." Now apply for a contract from the telephone company of your town.

Contracts vary for different sections and under different circumstances but the one most used (Cumberland Telephone & Telegraph Co.) is in brief like this: The people who are on the party line construct their own line from the terminal 'phone to one and one-half (1 1-2) miles of the central where they tie on to the Telephone Company's line. The line up to where they tie onto the Telephone Company's line is the property of the "Farmers Company" and must be kept up by them. The Cumberland Telephone & Telegraph Co. will then lease you the use of their central for $36 per year on this one line of only six boxes, but if you want more boxes they can be added and six dollars ($6) per year paid in addition for each box. So after constructing the line, the patrons of a party line can have use of the telephone company's exchange for 50 cents per month. And in addition to this you have the use of any of the company's lines at the usual tariff rates.

Some farmers object to the party line on account of so many boxes being on it. This sounds reasonable unless you have had experience with a party line. Twelve boxes can be easily handled on one line, and while you have the advantage of making the construction of the line cheaper for each party, you also have the advantage of having every neighbor at your door, through the telephone. The more boxes you get in your neighborhood, not necessarily on the same line of course, the more use your telephone will be to you.

There are two systems of telephones, viz.: Grounded or one wire and metallic or two wire. The two wire system is by far the most satisfactory and should always be used if possible.

The following is the actual cost of

constructing an eight and one-half (8 1-2) mile metallic or two wire line of 8 boxes:

Wire (No. 12) and insulators per mile	$13.00
Labor (all done by farmers) per mile	15.00
Cross arms, per mile	1.00
Poles (furnished by farmers) per mile	17.00
Total	$46.00

Of this amount the poles were furnished by, and the labor of construction was done by farmers, thus reducing the actual expenses $32.00 and making the actual cost $14 per mile. To this must be added $14.00 the cost of telephone box and equipment for each subscriber. Thus we see that a line of eight miles with eight subscribers will cost each person only $28.00 in actual money for construction and equipment.

The poles should be not less than 22 feet long and at least 4 inches in diameter at the little end. They should be straight, reasonably free from knots, and roofed at the upper end so as to be protected against rain. Posts of green cedar, chestnut, or some such durable timber is preferable. They should be set at least four feet in the ground.

In constructing farmers' lines the use of inferior and cheap materials should be guarded against, for best service cannot be gotten on such lines. The use of makeshifts such as posts that are not durable, or tieing to trees should also be avoided, because these will give continual annoyance as long as in use.

DEVELOPING THE DAIRY HEIFER

By FRANK HINES, '14

Next to breeding, feeding is the most important and is even more difficult than breeding, for it is hardly necessary to talk breeding until the farmers better realize the importance of it. The greatest failure is due to a failure to feed the right kind and a sufficient amount of feed. Growth can hardly be encouraged too much, and every animal should have the privilege of making its maximum natural growth, the form depending to a great extent upon the breed.

The comparatively narrow ration of skim milk does not give the waste of protein in small calves that it does when fed to older cattle, and the calf is supplied with abundant materials for growth. The ration might however be too narrow, for the best gains are made with a ratio of about one part protein to five and one-half parts of carbohydrates. As the calf becomes older—six to nine months the ration may be widened gradually.

To obtain good milch cows the very rich ration that is first fed must not be kept up too long, or else a tendency to fattening rather than development for milk production will be created. The main object is to keep the calf growing constantly from the time it is dropped until it has reached its full maturity.

If the heifer is to produce milk abundantly in the dairy, the habit of

laying on flesh beyond a certain limit must not be encouraged. If the young animal is fed on foods low in mineral matter and protein the frame work is sure to be deficient and weak, and the outcome is dwarfed development.

There are many methods of caring for the calf, but the one most generally practiced is to allow the calf to remain with its mother only about one day then to remove it entirely out of her sight, and after about twenty-four hours, by letting it suck the fingers, gradually lower its head into a pail of fresh warm milk, preferably its mother's. Feed warm whole milk for three or four weeks, then gradually change to skim milk so that in eight or ten days the milk ration consists entirely of skim milk. A good plan is to mix equal parts of corn, oats and bran and allow the calf to eat of them as soon as it will. Usually it will begin eating at about two weeks of age. The Kansas Experiment Station and others have shown that just as good results can be obtained by feeding skim milk, and while the cost of raising a calf on whole milk is about $7.00 per 100 pounds gain, it only costs about $2.25 per 100 pounds gain with skim milk. Also a bunch of calves raised on skim milk was placed in a feed lot with some raised on whole milk, and made much better gains.

If a calf is fed heavily on grain and a light roughage ration its digestive ability will not be well developed. From an article in The Breeders Gazette, but proof is not given to bear out the statement, fifty calves were fed all they would consume of wheat, bran, oil meal, silage and clover hay and at calving time were hog fat. Only a few were fit to keep for cows, so were sold to the butcher. With their second calves nearly all the remaining ones were also sold for beef. Another lot of calves was fed a greater amount of roughage and developed into fine cows. When a heavy grain ration is fed the calves will not eat enough roughage, and if fed grain lightly will consume much greater quantities of roughage.

In developing heifers the main object, then, is to make growth and develop capacity, so feeds rich in protein and very bulky should be fed, such as skim milk, Leguminous hays, etc. When good clover or alfalfa hay can be fed with silage there is a question among breeders as to whether the heifer really needs any grain, but most of our progressive dairymen seem to prefer small amounts of grain. One writer in a Farmers bulletin says that a heifer should be kept growing from the time she is dropped until mature, and this should be done by the use of all the hay and roughage she will consume, and with only a small amount of grain.

It is a well known fact that capacity in dairy cows is very essential and in order to develop this, great quantities of bulky feed must be fed but not in such a way to stunt the growth. Skim milk, for the above reasons, is very good for the calf because of its bulky nature and lack of fat forming materials. Under proper treatment a calf will continue to grow from four to six years and every effect should be made to develop a large stomach and consequently a large capacity.

The heifer can be bred from fifteen to twenty-one months according to de-

velopment. Although some breeders object to early breeding because unless well fed the cows never develop as they should; but the general rule is to breed early getting a calf and one year's milk extra. This has proven alright where the first milking period is a long one.

Although many dairymen breed for the cow to be fresh with the second calf at a time when she will be most needed, many others breed so they can milk from ten to twelve months, and if well fed the heifer usually overcomes most of the undersize caused by early breeding.

After all that has been done and said with calf feeding there seems to be little danger of too much fat resulting from grain feeding provided the ration is made up of Leguminous hays and grain rich in nitrogen, but in every case large amounts of roughage are necessary to develop the capacity. The capacity is capable of being adapted to conditions and as roughage is a much cheaper food than grain it is very necessary to feed large amounts where the most economical gains are to be made. Size depends much upon heredity, but even more upon liberal and careful feeding. It is impossible to starve good dairy qualities into a cow, but many a promising heifer has been stunted into a poor cow.

I believe that the whole thing can be summed up in these words from The Breeders Gazette for January 1st, 1913. "The opinion is that the heaviest feeding consistent with health, and proper skeleton forming foods cannot interfere with the dairy type. The dairy function is not an accident; it is an endowment from the sum of the ancestors, and that whatever possibilities there are in a certain individual are to be fostered by strong feeding in youth rather than otherwise."

BEE KEEPING AS A SIDE LINE

By G. S. McINTOSH, '16

One may keep bees for the sake of honey, a very good reason, for honey is a luxury which comes to the bee keeper free of expense. Aside from honey as a luxury the bee keeper will find that a few hives of bees will add materially to the family income. Women and children with comparatively little time and attention can maintain fifteen or twenty colonies of bees. Women are especially adept in the management of bees and may in this way earn their pin money by a work which they really enjoy and which is in truth a recreation from their more arduous duties. Children, too, enjoy this work and many boys have made their college expenses through the aid of a small apiary. No orchard or garden is complete without a row of white hives, which not only give it a picturesque background but whose inhabitants aid materially in its development.

A person beginning bee keeping should by all means begin in a small way. Nothing will take the place of real experience. It is best to start out with very few colonies, three or four at most. The development and work

of these colonies should be watched at every opportunity. It is also a good idea to visit and work with other bee keepers and to adopt whatever is found to be an improvement on your own past system and practice. Books, periodicals, and government bulletins on the bee culture should be read and their advice followed in every practical way. In addition to this, one who is about to embark in the bee culture should be interested in his work in order to insure success.

Special attention should be paid to hives. The old fashioned box type should be discarded since the bee keeper must kill some of his faithful workers in order to obtain the honey—a honey of poor quality since it is generally stored in old combs along with brood and pollen from poisonous plants. When a disease is started in an old fashioned box hive it can only be treated by breaking open the hive. One is at a total ignorance of what is going on in one of these hives, while in the new patented hives one can keep a daily lookout without disturbing the bees and thus watch closely their movements and actions. Good hives equipped with full sheets of wax foundation wired in frames can be had at any bee supply house.

It is best to procure bees as near home as possible for the purchaser can then see the bees before buying and also avoid the shock occasioned by a long journey. If Italians or Carniolians can be had at the same price they are best for the beginner, but if common black bees can be had for several dollars less, take them for they can be Italianized at the cost of a queen. Of course the price of colonies is varicable, but a fair price for black bees in up-to-date hives is five dollars, for Italians two or three dollars more. The colonies purchased should be in up-to-date hives or if not should by all means be put in them at the earliest opportunity.

Location is an important factor. To be the only bee keeper within a radius of two or three miles is a distinct advantage, but for the small bee keeper a much smaller area will suffice. A large crop of clover or alfalfa, an orchard or a garden, near at hand, will insure a correspondingly large yield of honey. It is also important to give the colonies a southern or southwestern exposure in order to insure safe keeping during the winter.

Swarming on account of the loss of working force is considered a nuisance by bee keepers. It is almost impossible to keep from losing a swarm now and then and for this reason precautions are taken against swarming. One of the best of these is to have large roomy hives and to kill all extra queens. When bees do swarm, however, they generally go to a branch of a tree, a post, or something which can be sawed off and carried before an empty hive (which a wise keeper will always have ready for such an emergency) and when shaken slightly will cause the swarmers to enter the hive.

In robbing the hives one cannot be too careful, for stings even at their best are not pleasant. Bees will not tolerate the jarring of their hives, mashing bees in taking out the frames, or the odor of horses, and will protest most vigorously and effectively against such indignities. When properly treated by a few puffs of smoke at the top and bottom of their hive bees become very docile and

while so the honey is easily procured.

Besides the enjoyment and interest obtained through the keeping of bees there is also a material side of the question for one gains a profit of from four to ten dollars on every hive. By all means get some bees and you will never regret it for when you get the "Bee Fever" you become enthusiastic in an interesting and enterprising work in which your enthusiasm will never wane.

NEWS ITEMS

DOMESTIC SCIENCE DEPARTMENT ENTERTAINS WITH LUNCHEON

By BETTY M. HUNT, '14

On Friday, November 7th, Miss Mulligan, the head of the Domestic Science Department, entertained one hundred and fifty guests at luncheon at Tennessee Hall. The luncheon was given in honor of the visiting delegates of the Association of Southern Colleges, which held its nineteenth annual meeting here on the sixth, seventh, and eighth, and the guest list included a large number of the faculty of the University.

Tennessee Hall, the Home Economics Building, was beautifully decorated in autumn leaves, ferns, and palms, while the tables were attractively ornamented with vases of yellow and white chrysanthemums.

The second floor of the building, used for class rooms, laboratories, and a model dining room, served on this occasion to display the work of the different Domestic Art and Domestic Science classes, very interesting and attractive posters and charts being particularly remarked upon. These charts showed a great deal of the work done last year, house plans and house decoration for the Seniors, Cake and Bread charts and meals planned and served, with the cost, colorific value, time used, etc., for the cooking classes. Splendid examples of the work done in sewing were exhibited, showing the application of the various stitches, the garments made, and the like.

After inspecting this second floor, the guests ascended to the third story, where the most interesting of all the department's work was found—the practical application of the Laboratory equipment. Here the luncheon was served by the cooking classes, uniformly dressed in white.

The menu follows:

Grapefruit

Veal Croquettes

Creamed Potatoes and Cheese

Scalloped Oysters — Rolls

Tomatoes — Lettuce Salad

Ice Cream — Cake

Coffee

THE U. T. FARMER

Scientific; therefore practical

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EDITORIALS

Hunting season is now open and the law permits one to shoot game. Many farmers have anxiously awaited the "opening" of the season, the time when they might take out their dogs and have a big time shooting birds. There is really great pleasure in hunting and we realize how the farmer, who gets very little recreation at the most, will naturally avail himself of this one harmless sport. As much as the farmer deserves the pleasure he gets from hunting birds, we wish to discourage this particular kind of recreation. If he finds pleasure in hunting rabbits it is very well, for the rabbit is the farmer's enemy and its destruction is a blessing to him. But it is quite different with the quail for this bird is the farmer's best friend.

No hunter when shooting quail stops to consider the character of the bird he is killing. In most cases he does not know. We wish here, in as brief space as possible to give some hints that will put the farmer and hunter to thinking. We believe that the conclusion reached will be that a farmer can not afford to indulge in a pastime which means so much indirect loss to him.

The quail is the greatest insect and weed-seed eater we have and never does any damage to farm crops. In a pamphlet of the Florida Audubon Society, C. L. Hodge says, "It [the quail] does practically no harm whatever and seems to specialize on the most pestiferous insects and weed seeds; and its large size compared with other insectivorous birds, renders it capable of doing an amount of good service which few people realize. From different crops representing a single meal (and the bird probably fills its crop from six to ten times a day) have been taken 300 seeds of smart-weed, 500 sheep sorrell, 1000 of ragweed, 5000 of pigeon grass, 10,000 of pigweed, a tablespoonful of chinch bugs, and over 100 potato beetles. Feeding tests with a pet bobwhite hen reveal the possibilities of the birds' work in a garden or field; one

day, 59 adult potato beetles, another, 1,286 rose slugs, another, 5,000 plant lice and 568 mosquitoes in two hours. In addition to the above the bird is known to feed upon the cotton worm, the boll-weevil, cutworms, cabbage worms, cucumber beetles, squash bugs, grasshoppers and crickets, army worms, and the Hessian fly. If the estimate, $795,100,000, annual damage to farm crops in the United States from insect ravages is correct, and it is much too low if anything, the bobwhites alone might save us over half this amount, if the people would give it a chance. Other tens of millions would be saved in weed seed destruction."

Many statements based upon actual experiments and given by prominent men compare very favorably with the above. In a Leaflet of The Natural Association of Audubon Societies, Edward Howe Forbush states "Dr. Sylvester Judd, by careful computation, reaches the conclusion that the bobwhites of Virginia and North Carolina consume annually, from September 1 to April 30, 1,341 tons of weed seeds, and that from June 1 to August 31, they eat 340 tons of insects."

When we consider the trouble that we have with injurious insects and weed pests and when we think how the quail is doing all in its power to help us combat these evils we cannot but have a kindly feeling towards this bird. Let us all protect bobwhite in every way we can this winter and he will repay us many fold next summer, by his ravages on injurious insects and weed pests.

In the fall of 1911 the West Tennessee Experiment Station purchased a small Holstein dairy herd consisting of 8 females and one bull. It is remarkable what records this herd is making. In the two years the number of females has doubled, now being 16, and bulls to the amount of $835 have been sold. Every cow that has freshened in these two years, 8 in number, has made the Advanced Registry Record. Of these eight several have made exceptionally high yields.

Lady Woodcrest Colantha Lad 136,686 is at present in her first period of lactation. Up to November 1, in 313 days she had produced 12,142 lbs. milk and 565 lbs. butter. She has all of November and 22 days in December before her year is up. It is expected that in this first period of lactation she will produce nearly 14,000 lbs. milk and twice as much butter as is required for admission into Advanced Registry.

Violet Houwtje Lady 121,618 who is in her second period of lactation is also making exceptional yields. Up to November 1, in 260 days of this period, she had produced 12,164 lbs. milk and 601.6 lbs. butter. In the remaining 105 days of her year's time she will probably produce enough to make her record for the twelve months be 18,000 lbs. milk and 900 lbs. butter.

A few such producers in every dairy in the state would make Tennessee an exporter of butter instead of an importer as she now is.

For the advantage of those who have still some hogs in the fattening pen we wish to call attention to the practice of feeding cotton seed

meal in the fattening ration. Many feeders are afraid to feed cotton seed meal to hogs under any circumstances, but a large number of experiments by various Experiment Stations have proved conclusively that for the last period of feeding, about two weeks, it may be fed with perfect safety and with excellent results. If one part of meal to every nine parts of grain is given for the last 14 to 21 days of the fattening period, gains will be made cheaper and no bad results will follow.

NEWS ITEMS.

Professors H. A. Morgan and H. H. Clark were in Washington a few weeks ago attending the meeting of Experiment Station, Agricultural College, and Institute workers.

Dr. M. Jacob delivered an address on "The Tuberculosis Problem" to the Tennessee Veterinary Association which was held in Memphis a few weeks ago.

We are sorry to report that Mr. E. T. Arnold has returned to his home in Winchester on account of illness.

Mr. Briggs was attending a meeting of the American Pomological Association and National Conservation Congress in Washington, D. C., week before last.

The West Tennessee Experiment Station has begun a feeding experiment with 250 cattle.

The steers have arrived at the farm and have been put in lots of five to try experiments with different rations.

The program for the Short Course this month is:

December 1-6 at Camden.

December 8-13 at Union City.

December 15-20 at Alamo.

December 22-27 at Ripley.

December 29-January 3 at Covington.

We are glad to hear that H. P. Ogden, of '12 has a fine school at Clarksville. Professor Pridmore addressed his school on Agricultural Problems a few days ago.

The Agricultural Club had its regular meetings November 4 and 18. At the last meeting the following officers were elected:

F. S. Chance—President.

O. L. Farris—Vice-President.

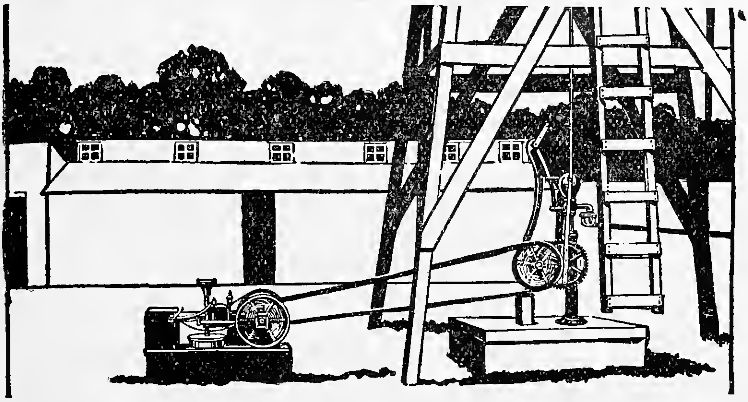
G. B. Thackston—Secretary and Treasurer.

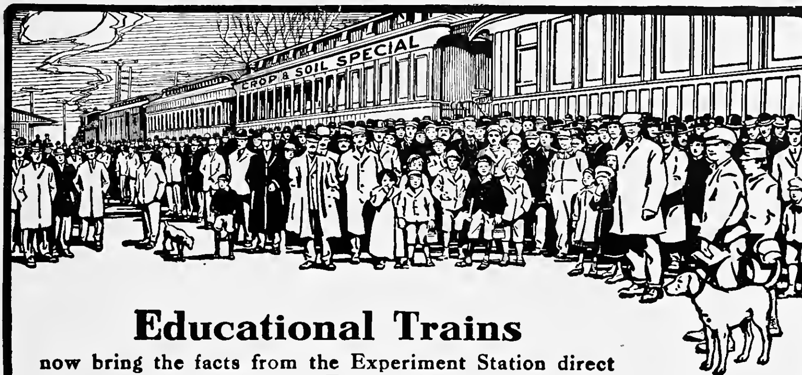
F. W. Fleming—Critic.

C. M. Hume—Sergeant at Arms.

The Club discussed whether or not they would attempt to establish branch organizations of the club in the different high schools of the State. The Agricultural Club of the California State University has done this with quite a success. Nothing as yet has been definitely decided upon.

Those that are attending the International Live Stock Show at Chicago this week are: D. T. Hardin, Hume, Cantrell, Moore, Ridley, Dougherty, Ezell, Rainey, Worden, Tolley, Harlan, and Boyers.





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The Experiment Station men are anxious to discuss the questions of most value to the people along the routes. Ask them to bring along an exhibit of fertilizer materials and to tell you how to get the most plant-food for your money.

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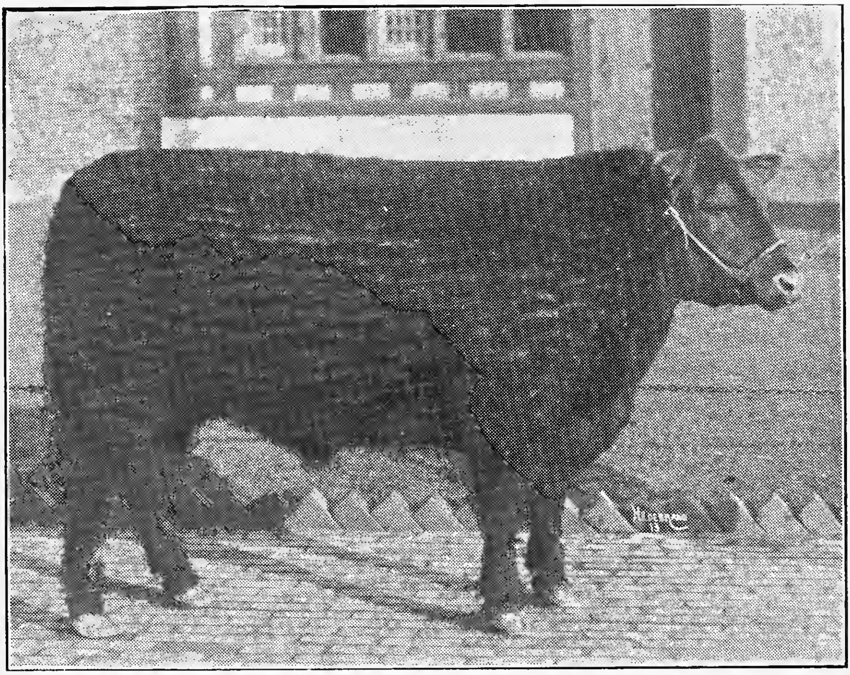

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GRAND CHAMPION STEER

INTERNATIONAL STOCK SHOW, 1913

Vol. VIII JANUARY, 1914 No. 4

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Contents

UNIVERSITY ENGINEERS MAKING ROAD.

THE U. T. FARMER

Vol. 8. JANUARY, 1914. No. 4

THE INTERNATIONAL LIVE STOCK SHOW.

By C. M. HUME, '14.

It was a great show. The best one yet, the wise ones tell us. Viewed from the number (there being about 4,500 single entries) and quality of exhibits, the 14th International surpasses any previous show. The daily attendance exceeded that of former years by several thousand.

From start to finish there was "class" in every department. The colleges started the ball rolling Saturday by the students' judging contest, in which teams from 12 colleges competed. Texas won first place for the first time, and received the trophy offered by the Union Stock Yard and Transit Co. This is the sixth year Texas has been in the fight. Missouri secured second place and Purdue a close third. Tennessee did not have a team in the contest, but it is hoped that next year the Tennessee University may be represented. Ten students, accompanied by Prof. H. A. Morgan and Mr. D. T. Hardin of the Agricultural Department made the trip. Others from East Tennessee were W. B. Stokely, President of the East Tennessee Farmers' Convention, of Dandridge, Alfred Swan, also of Dandridge, and Geo. S. Stokely of Newport.

The show began in earnest on the following Monday, which is known in international parlance as "Belgian Day." Pure bred and grade steers, college and experiment station stock, and Belgian horses were judged in the big arena and grade, cross-bred and college stock were passed on in the sheep and swine rings. The judging work was not completed till Saturday morning, so that at almost any time of day visitors might see high class animals being judged in their respective classes. Well known breeders from the United States and Canada, with a few exhibits from England, vied with one another for the blue and purple. There were few walkaways in any of the classes shown. The most hotly contested Belgian class was the two year old in which Loeser Bros. of Ligonier, Ind., won first, with Crouch and Son, of Lafayette, Ind., a close second.

Monday night the agricultural college students held a banquet in the "Exchange" Restaurant. About 200 attended and, after partaking of a bountiful repast, displayed considerable rivalry in college yells and songs, after which an excellent program of toasts was heard. Missouri is due much credit for the admirable manner in which this banquet was pulled off.

To the average visitor, however, Tuesday was, without doubt, the

most interesting day of the show. At a few minutes after 11 o'clock, 8 steers, winners of their respective classes, were brought in for final inspection. Judge J. R. Campbell, Lairg, Scotland, soon picked an Angus steer shown by J. D. McGregor, of Brandon, Ont., as the Grand Champion steer of the show. What is most significant about this victory is the fact that McGregor has carried off the purple for the second time, his steer being the grand champion in 1912.

In the meantime the carload lots of cattle were being passed on. There were 110 carloads entered in the exhibit, but a culling committee reduced the number to 74. First honors went to Escher and Ryan, of Irwin, Iowa, on a bunch of yearling Angus. A fine load of two-year-olds owned by the same company captured second place.

Southern visitors found great satisfaction in the showing made by the Lespedeza Farm of Hickory Valley, Tennessee, and the Davis Farm of Jackson, Mississippi. Northern breeders are beginning to realize that the South will be heard from in the future and the strongest competition may be expected from that quarter.

A very meritorious exhibit of sheep was made in the carload contest. Idaho was the chief contributor, the grand champions being Shropshire grades from the ranch of Knollin and Finch, of Soda Springs.

An exceptionally well-fitted bunch of Berkshire hogs from the Meadow Brook Farm, Burlington, Kansas, was awarded the grand champion honors from among 20 competing carloads.

Year by year the International is being recognized more and more as an educational institution. It must be admitted that many go, look through and come away without gleaning any ideas of value. What they have learned is in the abstract, but nothing definite or tangible. Seldom do they realize the rare opportunity they have lost. But the lessons which may be learned are many for the man who will but apply himself and work with the proper spirit.

Here one can learn which are the best of all the different live stock types, and can compare the relative merits of breeds. He can also learn through observation and talks with experts, both theoretical and practical, the best methods of breeding and feeding. The present demands of the market, and the indisputable effect of pure bred stock are but a few of the lessons the wide awake student may learn.

The good effect of this show can not be overestimated. Southern cattlemen have not grasped its full meaning. The South is destined to become a great live stock country and it behooves every farmer to take every means presented to study market demands and the best methods of meeting these demands.

AGRICULTURE IN THE RURAL SCHOOL.

By L. P. GABBARD, '15.

We often hear the question these days, "What is the matter with the country community?" People of other centers of living have taken up the cry and made favorable communities appear much in need of special treatment. It is true, the country has its problems. The church, the school, and the home may all be improved. But the country church is no more a problem than most other churches, neither is rural social life in any greater need of directing and uplifting than other centers. Each community has its problems and these problems are, in the large, to be solved from within the community. The work of redirection has already actively begun in a number of country-life institutions. We no longer need to point out the problems so much as to aid in their solution. Rural education seems to offer the most fertile and responsive field for improvement. Only one phase of country life will be taken up here—that of agriculture in the rural school, or better still, the rural school in agriculture.

Farming is at once recognized as the greatest activity of the country. The problem, then, is how may we make farming more attractive, more practical and more profitable; how may we bring a knowledge of scientific farming to every farm? In this connection we think of our rural, common and high schools as the most universal public organizations through which this may be accomplished. In bulletin number seven which has been recently published by the United States Bureau of Education, we quote the following: "The high school should, in a real sense, reflect the major industries which support it. The high school as the local educational institution, should reveal to boys and girls the higher possibilities for more efficient service along lines in which their own community is industrially organized." This is a timely statement, and its truth is rapidly becoming accepted. The study of Latin and Greek does not "reflect the major industries of a community." The study of them is all right in its place—and cultural education is not to be decried—but in high schools and common schools their place is distinctly subordinate to rational industrial education. Let us have a more practical course of study, one that will directly train and assist the boys and girls in the part they will have to play in our industrial world.

This movement of re-direction is no sudden craze. It is strictly in harmony with the recent tendency in education to re-direct the schools of a community in terms of the daily welfare of its people. For the rural community such re-direction must be largely in terms of agriculture, and other country-life subjects, but

chiefly in terms of agriculture. The country church is made powerful and prosperous by means of bushels, pounds, and dollars. Likewise, by these the home is rendered more independent and happy. This movement of reorganization merely means, then, that we are gradually passing to higher levels and to broader views of life; that educational procedure is keeping step with this onward movement and is constantly readjusting itself to conditions. That is to say, education is becoming a real part of life. In the past fifty years or more we have been adding to college courses one course after another, among which are medicine, mechanics, engineering, and other professions, but at last we have introduced a leaven into the very center of the lump. This ferment is education by means of agriculture. This is the ferment that will vitalize and humanize our rural schools. We do not add agriculture merely for the sake of adding one more thing to our educational institutions, but, as Professor Bailey says, "to re-make much of our education in a spirit of real democracy." Let the course of study be such that the girl or boy will be given a chance to observe and discuss objects and affairs as they really are. Such a course will take them to the field, the farm, the forest, the stable, the dairy, the harvest, and the market. It will endeavor to make the common things of life worth while. If it does no more than to interest the children in country-life subjects so that they may know the common birds, insects, tree, weeds; the meaning of some of the best farm practices, such as selecting and testing seed corn, how the soil holds water and means of preventing its loss, care of milk and the value of its fat content, the attempt will be far from that of a failure. It will lead them to appreciate more fully the significance of the immediate world in which they live.

The point has already been made that the child should be educated responsively to its environment and to the better outlook for country life; that the school should be a part of the out-of-doors; that fields, woods, crops, and live-stock should be utilized educationally. The question naturally arises, how may this be done? What is the most effective way of presenting Agriculture in our rural schools, and how may the ideas gotten there be carried into the home? In this connection let us consider the benefits and possibilities of a school-garden for every school, and a child-lot for every farm.

There are many benefits to be derived from the school-garden idea, if it is properly worked out. Through it as a medium, the teacher may acquaint her pupils with the plant, and plant life in general; the simple, yet interesting, relations of the plant to heat, light, and moisture. Teachers who have been most successful are those who have selected agricultural subjects of special interest to the community, and who have used methods calling for self-activity on the part of the pupil—having the pupils learn by do-

ing, rather than by reciting. This may be done through experimental plots for plant breeding, soil inoculation, and other soil experiments; ear-to-row method of improving corn; seed germinating, including tests of viability; collection of economic plants, weeds, weed seed, and insects, budding, grafting, pruning, and spraying of fruit trees. And best of all, if these lessons be rightly applied, they will find their way out into the community in which the school is located and help to improve the methods of farming. In a certain county in Iowa where it is the practice every spring to have a germinating test for corn, one teacher reports: "My boys, who would not go across the road for a song book, went two miles in the snow to get some sawdust for a germinating box. When the corn had germinated the farmers came to the school-house to see how their corn had turned out, and incidentally saw the work of the school. Why, farmers came who could not remember when they had been inside of a schoolhouse!" So far as the children are concerned, such a garden will supply wholesome recreation, provide healthful occupation, add to the store of knowledge, and develop a spirit of friendly competition. The degree of success in each case, however, will be determined largely by the teachers' ability to make the best of conditions as she finds them.

This school-garden idea may be taken to the home by establishing a child-lot on every farmstead. This is advocated by Professor L. H. Bailey and others vitally interested in country-life improvement. Country life can never be developed effectively until the homes and schools are brought into closer touch with each other. This step offers a bridging link. Not only will it bring the home to the school, but best of all, it will bring the school to the home.

It will be the duty of the teacher to set problems to be worked out on these plots, and have reports of results come back to the school. Exhibitions from time to time will act as a good stimulus and create friendly and wholesome competition.

This plot offers an opportunity for many tests and demonstrations. New varieties of fruits, crops, and flowers could be tried; fertilizers in a small way could be tested; spraying could be studied; and the different methods of planting and tilling illustrated. It would be an outdoor room in which many interesting things could be collected, and problems worked out. It would soon become the most interesting work of the farm.

WINTER ONIONS.

By J. U. GILMORE, '15.

It has been found possible and profitable for the Tennessee market gardener to grow onions during the winter. The smaller cities of the state, as well as the larger ones, demand an enormous quantity of these "appetizers." Winter grown onions are, as a rule, not nearly so "hot"

as the summer grown ones, and are much more tender. Prices necessarily range higher as is always the case when a crop is produced "out of season."

Winter onions are not grown from seed. They are grown from sets, from seconds, or from full-sized onions. If sets are to be used the seed must have been planted the summer before and very thickly in the row. In this manner a great quantity of sets can be produced. If these seed are planted early enough, are sufficiently cultivated, and thinned to 3 or 4 inches in the row, there will be formed full sized onions. These large onions when planted for winter onions, really produce a better onion than do the small set. However, considerable care must be exercised in pulling or lifting the large bulbs, as a bruise means a decayed onion later and the onions touching it are apt to rot also. These bad onions should be sorted out and thrown away. The good ones need to be dried in a shed or barn on the floor, after drying in the field for two to three days.

The best adapted soil is a rich well drained loam, with plenty of organic matter in it. A good crop rotation is one that will free the soil from weeds and provide it with organic matter. The following rotation will do very well: A cover crop of clover with manure applied in the fall and both plowed under the next spring, followed by a clean culture crop, as Irish potatoes. Some legume should be planted the third season, which can be removed and the soil prepared for onions.

The fertilizer (if one is used) should be a 4-8-10 (4% of nitrogen, 8% of phosphoric acid, and 10% of potash). The sources of the elements are—for nitrogen: Nitrate of soda, ammonium sulphate, and tankage; for phosphoric acid: Acid phosphate; and for the potash, muriate of potash.

About 800-1200 pounds per acre is sufficient and should be applied broadcast and worked in previous to planting. More nitrate of soda can be applied to hasten the growth after the plants are well started. Another 100 pounds can be added again in three weeks, if the gardener wishes to add it.

The soil should be broken deeply and thoroughly pulverized and mellowed. After the ground has been carefully harrowed it should be smoothed with a drag or a light roller.

The rows are marked 12 to 15 inches apart and six inches deep, with a small plow. The soil should now be loose enough in the bottom of the furrow to allow the forcing in of the onions when they are planted.

The onions may be planted any time from August 15 to September 15. They are set three to five inches apart in the row; the smaller ones closer together. The rows are filled with well rotted compost or rich soil.

The cultivation of winter onions is obviously not so arduous as the cultivation of summer onions. There are few if any weeds and these can be removed by plowing with a wheel hoe or by hoeing with a hand

hoe. Air must be admitted, and some cultivation must be done, for this reason. After freezing and thawing begin, considerable air will be allowed to enter in this manner.

Another charm of winter onion culture should be the fact that no insects harm them. All these pests are in their hibernation stage and are not on the "warpath" as they are in summer. The onion maggot seems to cause the greatest portion of the injury in summer.

Near the first of November the largest onions are pulled for market, care being taken to uproot none of the smaller ones. The cleaning or the removal of the skin and roots is done by hand. Six to ten onions, averaging the size of a man's thumb are tied neatly to form a bunch. It is quite in order to use a distinctive band to tie with, as the grower's name printed upon it will be quite a source of advertisement.

As a rule these onions are marketed locally, selling for 40c per dozen bunches. There is quite a sale for these onions when shipped to northern markets. The best returns, however, can be made if all the crop is disposed of locally. An average yield is about 1,500 to 2,000 dozens per acre, which should sell for $600 to $800.

As a word of warning to the uninitiated, ambitious person who wishes to grow winter onions, we would advise that he enter on a small scale, increasing the area as his skill and business grows. It is a good paying crop and one that should be grown more extensively than at present.

SCHOOL LUNCHES.

By MARY L. ALLEN.

The subject of "What to Eat" is the most important in childhood, and in the school room where lunches are served, is a good place for solving the question. In many large cities it has been proved that a wholesome, simple, warm dish served at the noon hour is a success.

As a result we have more and better school work; smaller need for special training to enable pupils to pass grades in the allotted time. If the plan results in better and more efficient work in the city schools, it should be equally beneficial in the one-room rural school.

The question of feeding school children in general may be regarded as an educational one, if it can be shown that the ordinary education of the schools can be made of greater value to the pupils if food is served by the school authorities, or if it can be shown that there are certain facts about food and certain habits of eating which should be given as part of public education, and which can be given best by the laboratory method. In order to make the work of educational value, sufficient money must be put into the experiment to cause it to progress. Serving the lunch in the school affords an opportunity to make it a

means of education in house-furnishing, and gives an opportunity to impress lessons of hygiene. Upon the unhygienic conditions of food sold to school children, Mrs. Ellen H. Richards planned the serving of simple yet attractive lunches to the students of the high schools of Boston. Whatever can be accomplished there may be done here, if we only adapt it to our own conditions.

The aims of school lunches are to serve those who live too far from the school to go home for a warm lunch; to teach the child the value of money and proper food; and lastly, to furnish a meal according to dietary standards. This will make it necessary that the teacher be well trained, so that the work may be carried on in an efficient manner.

If possible, the Board of Education should provide lunch rooms, kitchen, and a pantry with equipment and fuel, if not, some aid should be sought by public subscription. To serve luncheons successfully in school, the lunch room and equipment must receive careful consideration. In the case of high school lunch rooms, we find them usually in basement, well ventilated and lighted. The best arrangement seems to be to have the counter in the center of the room, and within the counter can be found the serving tables, milk, chocolate, and water tanks, sinks and dish washer. All labor saving devices possible that can be afforded should be used, if the other needs have already been met by the school board or the public. Thus, by having the counter in the center of the room all dishes may be returned to the counter as the pupils finish, and immediately stacked, so as to be ready for washing. In installing lunch rooms the first equipment may be more simple and additions may be made as is convenient.

In planning menus we recognize that the growing child requires a liberal supply of attractive, nutritious, easily digested food. Furthermore, the menus should be written in a conspicuous place on the blackboard, so as to save time in selection.

Good order prevails in the school room, both in the preparation and the serving, if the pupils and teacher have an understanding of the work, for two reasons: First, the lunches are not for purposes of revenue, and all realize that the best quality of food is furnished at cost. Second, the Board of Education and school principals consider lunch rooms equally important with other branches of school work.

In order to obtain the best results we should consider the many suggestions for lunch rooms which have been offered. The manager should know every branch of the work herself, so as to continue the work in the absence of others. All the work should be thoroughly systematized, so as to avoid wasting time, energy, or increasing the cost, by careless wasting of the materials. In this manner, the course in school lunches would be quite beneficial to the students by increasing their own knowledge, and by improving the health of the pupils.

OBSERVATIONS ON THE INFLUENCE OF DIFFERENT METHODS OF CULTIVATION UPON CORN YIELDS.

By F. G. VICKERS, '16.

During the past summer some interesting points were brought out in the different methods of cultivating corn. These methods were used by different farmers in different parts of the state. They were used on very different types of soil, varying from the thin hill-land to low, rich "made land."

Many of the farmers throughout the state have been practicing subsoiling, but there is still a large per cent who have not realized the value of it. To have a constant supply of water for the fine root hairs of the corn, it is necessary to have a good depth of loose soil. Especially is this true during periods of drouth. The loose soil should extend down to a depth of twelve inches at least. This is deeper than one can plow with an average team and turner, and besides it would not be wise to turn up the clay that is often found before this depth is reached. A good subsoiler will loosen the clay and leave it in the furrow. It is a well known fact that clay will hold much more water than any other type of soil, and in addition the clay subsoil contains more plant food than some farmers imagine. Hard soil will neither hold water nor permit roots to grow in it.

During the dry weather while most of the corn of East Tennessee was suffering for moisture, it was noticed that one man had a twenty-acre field that was green and growing nicely. On being asked why his corn was so much better than his neighbors', the owner replied that he had subsoiled the ground over a foot deep. He said that he was expecting a yield of twelve or fifteen barrels per acre, without any fertilizer. He said that he had been subsoiling for several years, and had found it to be profitable.

Another farmer in southern Middle Tennessee subsoiled a portion of one of his fields to see if it was profitable. On the strip that was subsoiled the corn grew faster and had a greener, richer color than the adjoining rows. He said that there was a marked difference in the size when it was only a few inches high. One could tell within a yard of where he stopped subsoiling.

Any one not knowing the cause of the difference in size would have thought that it was two different plantings, or that the particular section had been fertilized. He said the cultivation had been the same throughout the season. The increased amount of water and plant food in the loose subsoil caused the difference.

Another man in the same locality broke his land well in the spring, but did not subsoil. He used a small spring-toothed cultivator with plows about two inches wide to cultivate his corn. The plows tore up only

the surface of the soil. The fine roots of the corn were not disturbed. The soil was stirred often enough to keep a good mulch on the surface all the time. By so doing all the moisture was preserved in the soil for the corn to use as it needed it, instead of allowing it to evaporate. Very few of the bottom blades of the corn were dry even after the corn had passed the "roasting ear" stage. Most of the shucks began to show maturity before the fodder showed any sign of drying up. This man has reported a good yield from his crop.

Another farmer gave his corn a rather deep cultivation with a double-shovel plow, though he did not plow it after it had reached a height of three or four feet. He did not allow any weeds of any kind to grow among the corn. They were cut out with a hoe if the plow failed to get them. His corn looked greener and twisted less than most of the corn in the immediate vicinity. His yield this fall was almost equal to the yield of his previous crop, in spite of the drouth.

The preceding is a description of three different methods of cultivating corn practiced by four different farmers in Tennessee. All three of the methods give better returns than the average farmer gets.

In addition I will give the results obtained from experiments made by the U. S. Department of Agriculture for six successive years in twenty-five different states.

Two plots at each place were used. One was given the ordinary methods of cultivation. The other was prepared in the same way as the first, but no cultivation was given, except just enough hoeing with a weeding hoe to keep the weeds down. On the plots where the cutting of weeds was the only cultivation, the yield of fodder was 95% as much as where ordinary cultivation was used, and the yield of grain was 99% as much as where ordinary cultivation was given.

From this we draw the conclusion that the difference in yield does not pay for the difference in labor. On the other hand, experiments have shown that if a shallow cultivation with some kind of a cultivator and often enough to keep a good mulch, the yield will be increased. Such was the results obtained by the Middle Tennessee farmer, who used a small cultivator.

Now, it remains for the farmer to decide for himself which method of farming he is going to practice. Is he going to be content with a fair yield, or is he going to strive for the best?

We have before us now the following methods which give better than average yield:

1. Subsoiling.
2. Shallow cultivation.
3. Clean cultivation.

It has been proven that each of these three methods help to conserve the moisture supply and thus to increase the yield. Why not put all of them into practice on the same area and increase the yield still more?

THE COUNTY DEMONSTRATOR AND THE FARMER.

By C. C. FLANERY, '15.

The conditions of the American farmer are a direct challenge to him. He will either accept the challenge or surrender. It is a test for his ability and qualifications for self-government. He is an intense individualist, but he can either hang with others or else hang alone. He can be a progressive or a standpatter. He may take the advice of a worthy County Demonstrator or reject it. He may co-operate with his fellow men or revolt. But we have faith in the farmer. Freedom is in the air; less and less are men and women inclined to be bossed; ordered around or controlled. Every farmer longs to be independent, if he is not already so. But blind resistance is worthless—understanding must precede action. For this understanding the farmer has wisely turned to his best friend, his most able advisor, "The County Demonstrator."

If there is any one man that should be of supreme interest to the farmer it is the able county demonstrator. Each farmer has many problems, but the able county demonstrator has all the farmers' problems to solve. The mere mention of a few of them will serve to show that demonstration work by the well prepared man is no "boys' play."

First, he should induce the farmers to produce from the soil those things which man must have to sustain life, and as much more as civilization demands.

Second, he should instil into the farmers the value of a just return; teach him to receive such remuneration as his relative service justly entitles him to obtain. The farmer, I might say, cannot do this unless he takes the responsibility of being his own business manager.

Third, he should enlighten the farmer; therefore, he must understand the merits and demerits of the leading public issues of the day. He must know the trend of things, and the agencies operating to produce changed conditions.

The requirements for such a man are, that he be wide-awake, public spirited, enthusiastic, and that he view, without fear or favor, the contending forces and decide with prudence the course of duty.

Fourth, he should be strictly modern in his views. He must recognize that there is a difference between the old agriculture and the new. The difference, briefly, is just the same as that shown between the old practitioner with his calomel and quinine for every ailment, and the method of the modern practitioner, with his ability to diagnose every case and his great variety of prescriptions.

Fifth, he must know his mission. Think of a foreign missionary bound for Korea or Africa, to enlighten a neglected people, and not be able to speak their language. Think of a county demonstrator going out to advise farmers how to farm and not

know how to farm himself. He must know the people, and have a heartfelt interest in their progress. Then, and then only, will he be able to carry out his true mission, which is to improve and increase the progress of the American farmer through the improvement of his methods.

I recognize that this is a standard that is difficult to attain. But this is not a standard that I have made, it is what imperative conditions demand. A county cannot be elevated or modernized by an inefficient demonstrator or an indifferent citizenship. The hope of the county rests with the people. They have demanded a leader; let's give them one that can lead.

I have now considered demonstration work from the farmers' point of view. Let us next consider it from the demonstrator's point of view.

A county demonstrator, such a one as I have described, would certainly be of supreme value to any county.

The county demonstrator should plan his work so as to give the people their greatest need first. A plan like the following may be the best in many of our counties.

The first step is to become acquainted with the leading farmers of the county and get them to co-operate with you and the other farmers. Make your first movement a success; this will give them confidence in you and prove to them the value of co-operation.

Next, organize a county improvement association. This association should charge ten dollars per year for membership. The association should purchase a variety of male stock, so that the service would be of equal use to all farmers. A membership in the association should entitle one to free use of these registered sires.

Third, organize a co-operative store. At this store there should be farming implements, fertilizers, feeds, seeds and maybe a common vegetable, such as Irish potatoes. All purchasing should be done on the wholesale basis, whereby the farmer could save from three to five dollars per ton on fertilizers. Only those farmers holding membership cards to the county improvement association would profit by this advantage.

Fourth, after these two propositions are well established, organize a movement for good roads. This project should be put through by the association already organized. The first step should be to construct a main thoroughfare through the central and most thickly settled portion of the county. Then gradually as the county could afford to pay its part run branches out from this main pike.

Fifth, he should do all in his power toward establishing a rural credit system—endeavor to get every man in the county interested in this project.

Sixth, he should give advice at agricultural meetings, in institutes, and in private conferences, and by duplicated articles in each local paper in the county at quite frequent intervals.

I am aware of the fact, however, that it is a great deal easier to

write down a code of morals than it is to live up to it. But naturally I am an optimist. I love to think that today is the very best day the world has ever seen. I believe in the people, I believe also in the farmer. I love to portray the rugged farmer as the most reliable and prosperous of all citizens. But we cannot portray him as he is without referring to his few faults.

If there is any one word that appeals to the farmer it is the word prosperity. He has sacrificed his richest and most productive soil for this one thing. Every farmer wants to be prosperous and a farmer cannot be prosperous in the long run unless he be scientific. It is only by scientific methods that the fertility of the soil can be improved. The uneducated farmer is "at sea" when you speak of scientific methods. He cannot correlate science with practice. He must turn to the demonstrator for improved scientific methods. The farmer is forced to take greater precautions than the miner who extracts his wealth from the earth with the idea that it is never to be returned. By scientific farming the soil may continue to reproduce and that which is poor to begin with may be greatly improved.

The prosperity of the country rests with the farmers more than with any other one class. If there is no prosperity in the country the citizens cannot be prosperous. If agricultural conditions are not satisfactory, the individual conditions of the farmer cannot be satisfactory. The farmers cannot be prosperous except by co-operation; by better methods put in practice by an able demonstrator.

MECHANICAL POWER ON THE FARM.

By H. B. FREEMAN, '14, Engineer.

Power on the farm can be divided into two sources: First, power obtained from gas or oil engines, and second, the power derived from streams of water.

An oil engine can be purchased for about $100 that is large enough to do regular farm work, such as cutting ensilage, threshing, running the blacksmith shop, sawing wood, churning, etc. Power can be obtained from streams which will do the work that an engine will and do it cheaper.

The gas engine is a contrivance used to obtain mechanical power from the burning of oil or gas in a cylinder behind a movable piston. The cylinder enclosing the burning gases must be kept cool by circulating water over its outer surface. The neglect of this first requirement will cause a burned out or warped engine cylinder, which, of course, ruins the engine. There are two ways of applying water to the cylinder for cooling purposes. First, water is made to flow over the surfaces of the parts to be cooled sometimes by means of a small pump or

by the convection power of the unequally heated water itself. The water is cooled by flowing into a tank having considerable surface.

The second method is to allow the water to come to the boiling point, and the remainder of the heat goes off with the steam. A gas engine needs continual lubrication for the piston to prevent excessive wear. Instructions always accompany the engine, and should be closely followed.

The above points, however, are especially important, as upon them depends the life of the engine.

The second source of mechanical power on the farm is water power. Power can be obtained from falling water in an amount depending on the quantity and the height through which it falls. To investigate a stream for prospective water power the first step is to obtain an idea of the amount of flow, the height of fall and the variability of flow. The farmer can, of course, allow a much greater variation in flow than is possible in commercial plants, as the farmer can adjust the load to meet the variations in the power of his stream.

The height of fall can be measured by an ordinary level and a yard stick. if the distance through which the fall takes place is, say 20 or 30 feet, and the fall is comparatively rapid. In other cases it is better to have it surveyed with a surveyor's level.

The quantity of water, that is, the number of cubic feet per second, is obtained by use of a special kind of dam called a weir. In general the weir consists of a sharp-edged board whose length spans the stream in question and is perpendicular to the direction of flow. The front of the board must be set straight, that is, it must not lean away from the direction of flow or toward the direction of flow. The sharp edge must have the beveled edge down stream. The upstream side is not beveled. This sharp edge must be horizontal. The ends of the weir should be sharp, be fully as high as the water flowing over the weir, and these sharp edged ends should be perpendicular to the horizontal edge.

The height of the water over the horizontal edge is found next. Set a stake two feet upstream from the horizontal edge. This stake is made level with the top of the horizontal edge and can be done with an ordinary level. The distance of top of this stake to the surface of the water is the required height of water on the horizontal edge. This height may be from 6 to 16 inches with accuracy. The stream on the down stream side of the weir must be 3 or 4 inches lower than the horizontal edge. The velocity of the water as it approaches the weir must be very small; if it is not the weir must be made wider.

With this height on the horizontal edge the discharge of the stream can be found in cubic feet per second.

The following formulae may be of value to those who have had some experience with water power:

Let Q be the discharge of the stream, h the head as found above

and b the length of the horizontal crest; then

$$Q=3.33\left(b-\frac{h}{5}\right)\sqrt{h^3}$$

The horsepower of the stream is obtainable from this value of Q. Horse power=

$$\frac{Q\,H}{11}$$

where H is the fall of the stream.

To obtain this power either an overshot wheel, a turbine or an impulse wheel may be used. The impulse wheel is best for high heads and small discharges. The turbine is best for low heads. The overshot wheel is cheap and efficient, but as the speed is low it requires a large number of belts and pulleys to increase speed, which, of course, consumes considerable power.

An electric generator can be connected to a gas engine or water wheel and generate electricity for light and power purposes. The use of electricity is imperative when the source of power is a considerable distance from the point of application.

THE SHORT COURSE IN AGRICULTURE.

By J. E. RING, '16.

The Short Course in Agriculture at the University of Tennessee was organized in 1900 with a registration of 20 students. Since that time the number has materially increased, the last year or two it being about 200. Still, this is not near what it ought to be, considering the good, practical agricultural knowledge to be derived from the course.

The 1914 Short Course begins January 19th and ends March 14th; just the time that farmers can best afford to leave their farm work. Some farmers say they cannot afford to lose this time. It is true that they lose something by leaving their work to come up here and in some cases they lose considerable; but it is not a dead loss; it is an investment. A member of the 1912 class who owns and personally supervises the work on a farm of several hundred acres said that he was attending the short course, although he was losing many dollars at home every day on account of his absence. He stated that what he gained was worth much more than the time and riods. During the first four weeks, money it cost him. If he couldn't afford to miss it, can you?

The course is divided into two pegeneral farming is taken up, and during the last four weeks, dairy farming and horticulture.

The course is given in lectures and demonstrations by the faculty of the Agricultural Department of the University, assisted by distinguished lecturers, prominent breeders, and other men who have made a success in their lines.

There are many, especially the older farmers, who remain very skeptical about "book farming" and

Students of the State Agricultural College, Knoxville, Judging Swine

want to know what these professors know about real farming. They say that they just know what they have read and learned in class room and that they can grow things on the experiment stations because they have all the money they need to work with. These persons have altogether the wrong conception. The experiment stations try many things that they do not make anything on, but lose a great deal, yet these are to find out what can be profitably grown by farmers. The experiments are carefully kept account of and the results are accurate, so that definite conclusions can be drawn from them, and they are carried on in many different parts of the state, under different conditions, with different crops, so the results are quite conclusive. The individual farmer cannot afford to carry on experiments except in a very limited way and then in many instances they do not interpret their results right, and thus draw wrong conclusions from them. Here the fundamental principles of plant and animal life, physics and chemistry, are learned. By these and the experiments, farming systems are worked out to meet the conditions found in the state. The systems are common sense, practical ones, and not the old light-and-dark-of-the-moon superstitious way.

The time for the short course is rather short and so none of the finer points that are gotten in the 4-year course can be given, but only the most practical and useful, and these are given in such a way that they are easily understood.

The course begins with the soil, and here its composition, plant food elements, etc., are taken up. It is shown what elements plants take from the soil and which ones are usually deficient, hence what fertilizers to use. Different rotations of

crops are taken up and those are suggested which are best for the different types of soils and with which one can best keep up the fertility of his farm. Then we are taught how to feed these crops to get the best results, how much beef, pork, milk, butter, etc., might be made from an acre of any given crop and what combinations make a balanced ration for animals.

Thus it is shown how the elements of the soil pass into the plant and from there into the animal, where they are built up into meat, milk, or used to produce energy or power, as the case might be, and from here back to the soil. If the grain and hay is sold off the farm these necessary elements are removed and so the fertility is lost. For this reason we should grow more live stock. We learn at the short course to judge animals, to pick out the types and breeds best suited to our purpose, whether milk, butter, beef, or work. The distinction between the profitable and the unprofitable animal is pointed out, and the most profitable methods of handling and managing stock is shown. This year the East Tennessee Fat Stock Show comes off during the course, and so here will be a great opportunity for studying types of animals and the faults and good points.

During the last four weeks dairying and horticulture are taken up. The class gets to visit several truck and market garden farms around Knoxville, the creamery of this city, and some of the larger dairies. On these visits they can get new ideas and suggestions. The class gets considerable practice in milk testing, butter and cheese making, judging dairy cattle, and all the important items connected with dairying. In horticulture they get practice in vineyard and orchard pruning, root and top grafting, and other work connected with horticulture, under the supervision of an expert. They get lectures on how to grow different truck crops. During the course

there is a lecture on strawberry growing by one of the best strawberry growers in the United States, that is especially fine.

An attempt has been made in this article to outline, in a general way, the course, giving only the most important features. There are many other points that have not been mentioned, which are of great interest.

Any one who will come and take the course, taking careful notes on the lectures, will, we are sure, come to the conclusion that so many other short course men have come to, namely, "It was the most profitable time and money that I ever spent."

The enthusiasm derived from be-

ing with these wide-awake, enthusiastic men, both faculty and students. is worth a great deal to any one, and will cause him to put forth great effort to build up the agricultural interests of his community.

The expense is small, not over $35 or $45, and the advantages are great so let us have a record-breaking attendance for 1914.

HOME CONVENIENCES.

By LOIS CUNNINGHAM, Special.

In selecting a location for a home there are certain points that should be held in mind. A slight elevation, having proper surface drainage, with protecting hills or woods on the north, is greatly preferable to a narrow valley, a low meadow, or the north side of a hill. The house should face so as to get sunlight into all rooms, if possible. This may be accomplished by facing the house southeast, for example, instead of directly east or south.

In planning a home it is essential that the rooms should be located with a view to convenience in carrying on household tasks. The proper location of the kitchen and the dining room, the china closet, the kitchen sink, stove and work table means a saving of very many unnecessary steps and much useless labor. If food must be kept in the cellar in the summer time a dumb waiter with two or three shelves running from the kitchen to the cellar is well worth its cost. If an ice box is used it should be so located that it can be conveniently filled with ice and yet be near the kitchen. For use in cold weather there should be a pantry on the ground floor in which the food is kept, and this pantry should be within easy distance of the dining room and kitchen. If this is not possible a box can be turned on its side and fastened just outside the kitchen window and food kept in it. If your house has been built without regard to step saving in the position of dining table, sinks and cupboards, then a small table on rollers, especially if its capacity is increased by a lower shelf, will be found a great convenience. It can be used to advantage in setting and clearing the table.

Many a woman would not feel nearly so tired if she used a wheeled table like this and a high stool at the sink and work table.

The rooms in which the housewife works should be centrally located. Bring the living room near the kitchen and your own bedroom as close to both as possible. It is of just as much importance that the farmer's wife should be provided with a carpet sweeper, washing machine, bread mixer, and other labor saving devices, also with sharp knives, egg beaters. measuring cups and other kitchen conveniences, as it is to use separators in the dairy and other modern appliances in farm work.

Some labor saving devices for the kitchen are the fireless cooker, steam cooker, savory double boiler, adjustable oven, egg coddler, potato ricer, bread and cake mixer, savory roaster and meat chopper. If the farm-

er's wife and daughter can economize in time and energy required for household tasks, they will have leisure for other duties and pleasures, and for rest and recreation.

Home conveniences also have a reference to comfort and hygienic conditions. Flies and other household insects not only make work for the housekeeper, but are active agents in the spread of disease, and there is every reason why they should be kept out of the house by screens at windows and doors. Much may be done to prevent the breeding of such insect pests. Proper drains and other sanitary appliances are of the utmost importance in the hygiene of the home. The heaps of old tins, bottles, broken dishes and similar miscellaneous refuse often seen about houses may not be directly a menace to health, but they are a menace to the happiness and comfort of travellers. Broken receptacles often hold water in which mosquitoes breed and infest the whole neighborhood.

The more promptly and regularly all refuse of the household is harmlessly disposed of the better it is for the healthfulness and comfort of the home. If the ashes are kept free from organic wastes they can be used to advantage on the garden walks or to fill up low places.

Fire is a great purifier and to it may be committed all combustible wastes. An old stove used out of doors can be devoted to waste disposal, or a crematory might be constructed for this purpose.

Because of the great importance of water, both for purposes of drink and cooking, as well as for cleansing, it is necessary that it be supplied generously and be easily accessible. Saving in the use of water is too often the cause of ill health and unsanitary conditions of body and house. There are few places where a permanent home cannot be supplied with sufficient running water at comparatively small expense. Many houses might be supplied with never-failing running water in kitchen and simple bathroom at the expense of a small amount of piping and a few days of labor. When a high natural source is not available, water may be raised, periodically, by windmill, force pump, or engine to a large supply tank, or one day's supply may be stored. A generous, convenient supply of water should not be considered a luxury, possible only to a few, but a necessity obtainable by the many, even at the cost, if need be, of some other less important furnishing. To help insure purity of the direct water supply a flannel rag tied on the faucet will strain out suspended matter and can be changed often. A little charcoal in it may remove disagreeable odor and objectionable color. Charcoal can be washed and baked to kill any living forms strained out; but neither these nor any other filter can remove dissolved substances.

The lightening of house burdens by means of a well-equipped and hygienic home, by the use of household conveniences, and by the proper understanding and systematizing of home work, means that the home maker and her family may have opportunity for something beside the daily tasks, which too often leave neither time nor inclination for recreation.

THE U. T. FARMER

Scientific; therefore practical

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EDITORIAL.

New Year is here and the one time of the year for making resolutions. It seems to be a regular habit with some people to fix up a list of "Do's" and "Dont's" which they fully intend to carry out during the new year. As a matter of fact, they carry them out merely during New Year. Afterwards all is forgotten about the matter until the next "Resolution Day." What is there to be gained by this system? Does it not shatter the confidence we have in ourselves until we cannot any longer trust our own word? Do we not by this system of resolving and dissolving also weaken, and even many times completely paralyze, what little will power we possess?

We do not wish to condemn "Making Resolutions," but we do believe it useless and even harmful to "Make and Break" resolutions. If we have become so accustomed to this usage that we should not feel satisfied without making some New Year's Pledge, would it not be well for us to "Make and Hold" the resolution that we will "Never Make and Break" one? If this succeeds, all others must.

The Short Course in Agriculture, which is now in its fourteenth year, begins January 19 and, as usual, will continue for eight weeks. A department which has never before been represented will be introduced this year. Although the line of work heretofore has been exceptionally interesting and instructive, it is believed that this addition will add quite a bit to the course.

The addition that has been made is the Engineering department. Since the farmer must be his own engineer he will be very fortunate in getting some sound information along this line at the Short Course this year. The discussions will be upon farm machinery, forge work, water power, concrete, road building, and other practical subjects. They will be given by the most able men of the Engineering Department of the University.

From year to year the instruction has been becoming better and the numbers of students increasing. This

year every effort has been made to make the course the best ever given; it is left for you to make the number the greatest ever present. Come and bring your neighbors. Get acquainted with the leading agricultural men of the state, hear what they have to say, follow their advice and you will profit by it.

The fall weather has been exceptionally fine, and the country roads have not yet put on their regular winter garments—their cloak of red mud, ornamented by a mosaic of deep ruts. But bad weather will come and the roads, if nothing is done to prevent them, will put on this undesirable garb.

One of the cheapest and best ways for keeping the country road in good condition during winter is by the timely and constant use of the split-log drag. Almost every farmer is acquainted with this implement, as it is used in many sections in place of the roller and plank drag. It is very easily made; it consists of one or more logs which have been split into halves. The halves are laid parallel to each other, split side up, and nailed together by cross pieces. Logs six to eight inches in diameter are of a convenient size. The length and width of the drag will depend upon the weight desired.

When dragging, always see that the center of the road receives all the "extra" mud. This can be accomplished by hitching the drag a bit one-sided, that is, by hitching so that the drag will be drawn somewhat "cater-cornered." By letting the slant be backward toward the center of the road it will tend to push the dirt to the desirable place. If you have never tried the split-log drag on country roads, give it a trial this winter.

If you are not too busy with other farm work at this season, you can spend your time very profitably by filling little gullies which have started to develop. Ditches just starting can be checked very easily, but if they are left alone the winter and early spring rains will get their course so well established that they will be very hard to handle.

One of the most effective ways of stopping washes is by putting strawy manure into them. If the manure is put into the ditches in well matted forkfuls and at reasonably close intervals, the amount of manure needed is not great and usually the young washes can be totally checked.

If the gullies are very numerous it will be better to cut hillside ditches. This method is more troublesome but unless something is done to preserve these gullied slopes, they will soon be abandoned "balds." Make an effort to keep what soil you have and it will reduce your fertilizer bill.

The U. T. Farmer wishes a Prosperous and Happy New Year to all farmers.

Short Courses at University of Tennessee
Schedule of Classes

AGRONOMY, LIVE STOCK, AND ENGINEERING

JANUARY 19 TO FEBRUARY 14, 1914.

(Initials after subject stand for name of instructor: B.—Bentley; S. M. B.—Bain; F.—Ferris; J.—Jacob; M.—Mooers; H. A. M.—Morgan; M. M.—Mulvania; P.—Pridmore; C. A. P.—Perkins; V.—Voorhees; W. Willson.)

MONDAY, JANUARY 19.

8:00—12:00	Registration of students (Morrill Hall).
2:15— 3:15	Address—President Brown Ayres.
3:15— 4:15	Plant Food. M.
4:15— 5:15	The Breeds of Cattle. W.

TUESDAY, JANUARY 20.

8:00—10:00	Farm Machinery. F.
10:15—11:15	Breeds of Horses. J.
11:15—12:15	Soils: Origin and Classification. M.
2:15— 4:30	Judging Beef Cattle. W.

WEDNESDAY, JANUARY 21.

8:00—10:00	Forge Work. F.
10:15—11:15	Soils, Composition, Etc. M.
11:15—12:15	Breeds of Cattle. W.
2:15— 4:30	Judging Beef Cattle. W.

THURSDAY, JANUARY 22.

8:00—10:00	Water Power. C. A. P.
10:15—11:15	Phosphates. M.
11:15—12:15	Draft Horses. J.
2:15— 4:30	Judging Beef Cattle. W.

FRIDAY, JANUARY 23.

8:00—10:00	Concrete. F.
10:15—11:15	Draft Horses. J.
11:15—12:15	Potash. M.
2:15— 4:30	Judging Draft Horses. J.

SATURDAY, JANUARY 24.

8:00— 9:00	Breeds of Cattle. W.
9:00—10:00	Light Horses. J.
10:00—11:00	Plant Composition. P.
11:00—12:00	Disease-producing Bacteria. M. M.

MONDAY, JANUARY 26.

8:00—10:00	Forge Work. F.
10:15—11:15	Statistical Study of Agriculture. H. A. M.
11:15—12:15	Breeds of Sheep. W.
12:15— 1:15	Conformation and Soundness. J.
2:15— 4:30	Judging Sheep. W.

TUESDAY, JANUARY 27.

8:00—10:00	Farm Machinery. F.
10:15—11:15	The Agricultural Cycle. H. A. M.
11:15—12:15	Crop Improvement. P.
12:15— 1:15	Feeding Work-horses. W.
2:15— 4:30	Judging Sheep. W.

WEDNESDAY, JANUARY 28.

8:00—10:00	Forge Work. F.
10:15—11:15	Feeding Lessons. H. A. M.
11:15—12:15	Lime. M.
12:15— 1:15	Insect Control. B.
2:15— 4:30	Judging Light Horses. J.

THURSDAY, JANUARY 29.

8:00—10:00	Water Power. C. A. P.
10:15—11:15	Beef Production. W.
11:15—12:15	Nitrogen. M.
12:15— 1:15	Insect Control. B.

FRIDAY, JANUARY 30.

8:00—10:00	Concrete. F.
10:15—11:15	Soil Bacteria. M. M.
11:15—12:15	Conformation and Soundness. J.
12:15— 1:15	Beef Production. W.

SATURDAY, JANUARY 31.

8:00— 9:00	Breeds of Swine. W.
9:00—10:00	Age of Domestic Animals. J.
10:00—11:00	Animals and Animal Products. H. A. M.
11:00—12:00	Disease-producing Bacteria. M. M.

MONDAY, FEBRUARY 2.

8:00—10:00	Forge Work. F.
10:15—11:15	Rotation of Crops. H. A. M.
11:15—12:15	Farmyard Manures. M.
12:15— 1:15	Breeds of Swine. W.
2:15— 4:30	Judging Swine. W.

TUESDAY, FEBRUARY 3.

8:00—10:00	Farm Machinery. F.
10:15—11:15	Animal Breeding. W.
11:15—12:15	Conservation of Soil Moisture. H. A. M.
12:15— 1:15	Crop Improvement. P.
2:15— 4:30	Judging Swine. W.

WEDNESDAY, FEBRUARY 4.

8:00—10:00	Forge Work. F.
10:15—11:15	Jacks and Mules. J.
11:15—12:15	Soil Drainage. P.
12:15— 1:15	Animal Breeding. W.
2:15— 4:30	Judging Mules. J.

THURSDAY, FEBRUARY 5.

8:00—10:00	Water Power. C. A. P.
10:15—11:15	Green Manures. H. A. M.
11:15—12:15	Farmyard Manures. M.
12:15— 1:15	Animal Breeding. W.
2:15— 4:30	Judging Swine. W.

FRIDAY, FEBRUARY 6.

8:00—10:00	Concrete. F.
10:15—11:15	Farm Sanitation. J.
11:15—12:15	Preparation of Seed-beds. H. A. M.
12:15— 1:15	Animal Breeding. W.
2:15— 4:30	Judging Cereals. P.

SATURDAY, FEBRUARY 7.

8:00— 9:00	Contagion and Infection. J.
9:00—10:00	Sheep Parasites. H. A. M.
10:00—11:00	Grains and Grasses. M.
11:00—12:00	Animal Breeding. W.

MONDAY, FEBRUARY 9.

8:00—10:00	Forge Work. F.
10:15—11:15	Plant Diseases. S. M. B.
11:15—12:15	Common Diseases of Horses and Mules. J.
12:15— 1:15	Weeds and Their Eradication. P.
2:15— 4:30	Silos and Their Construction. H. A. M.

TUESDAY, FEBRUARY 10.

8:00—10:00	Farm Machinery. F.
10:15—11:15	Farm Insects. H. A. M.
11:15—12:15	Feeding Swine. W.
12:15— 1:15	Plant Diseases. S. M. B.
2:15— 4:30	Judging Cereals. P.

WEDNESDAY, FEBRUARY 11.

8:00—10:00	Forge Work. F.
10:15—11:15	Weather. V.
11:15—12:15	Management of Horses and Mules. J.
12:15— 1:15	Feeding Swine. W.
2:15— 4:30	Demonstration of Weather Instruments. V.

THURSDAY, FEBRUARY 12.

8:00—10:00	Water Power. C. A. P.
10:15—11:15	Hog Cholera and Its Control. J.
11:15—12:15	Alfalfa Production. H. A. M.
12:15— 1:15	Feeding Sheep. W.
2:15— 4:30	Judging Grain. P.

FRIDAY, FEBRUARY 13.

8:00—10:00	Concrete. F.
10:15—11:15	Sheep and Hog Management. W.
11:15—12:15	Clovers and Vetches. H. A. M.
12:15— 1:15	Diseases of Sheep. J.
2:15— 4:30	Judging Sheep. W.

SATURDAY, FEBRUARY 14.

8:00—12:00	Reviews.

NOTE—Dairying, Horticulture, and a continuation of the Engineering Subjects will be given from February 16 to March 14.

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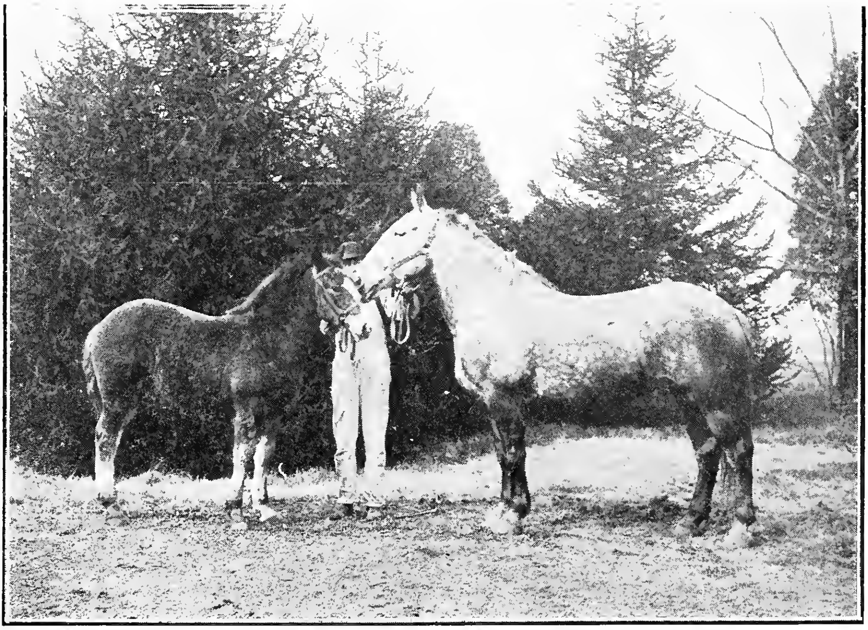
THE

U. T. FARMER



PRODUCTS OF TENNESSEE.

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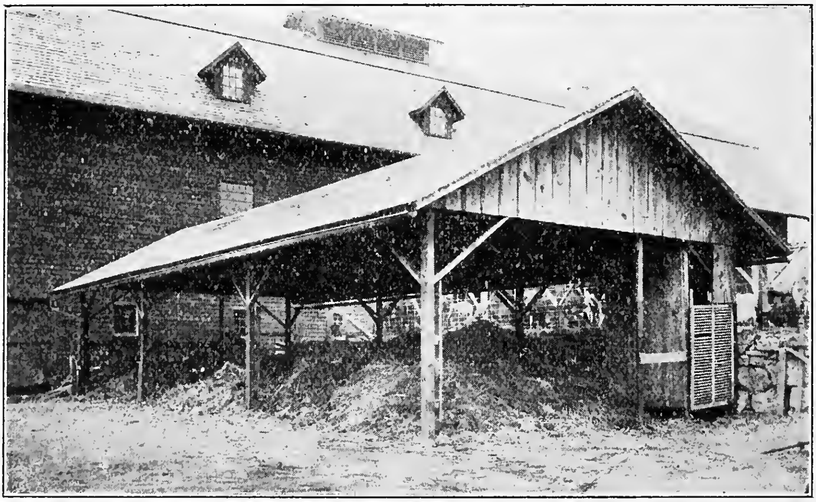

PROPER WAY TO CARE FOR MANURE.

The U. T. Farmer

Vol. 8. FEBRUARY, 1914. No. 5

THE BROOD MARE AND THE FOAL.

By JOHN E. DAIL, '16.

I.—Best Type of Mares For The Farmers to Keep.

First, let us consider briefly the type of horse best suited for doing the farmer's work. About the first essential in the farm draft horse is conformation. A horse that is compact, blocky, quick-stepping and active is the best type of horse for the farmer's needs. He should be wide in the chest, indicating lung-power, or constitution. The flank should be deep, as this indicates a good feeder. He should be short on the back, full in the quarters, heavy-boned, gentle, good-tempered, and wide awake, but not restless. The horse should not be too "chunky" and low to the ground, but should be tall enough to be a good walker.

Other essentials in the farm horse are quality, soundness, action, and weight. Quality simply means good breeding, and is an important point. We shall not dwell on the first three points, but will take up weight.

In considering the weight of a draft horse for his farm work the farmer should not go to either extreme. He does not want the light road type, which has style, speed, and endurance, but is too light for farm work. Neither does he want the heavy type of draft horse such as is used for drawing heavy loads on pavements and turnpikes. The latter are too heavy and clumsy to do good farm work. What the farmer does want is a horse of the conformation described above, and weighing from 1,200 to 1,500 pounds. This is the ideal horse, since he is able to draw a good load and at the same time has action and a fair amount of endurance.

If the farmer is going to breed this type of horse, which he so much needs, he must keep a brood mare of somewhat the same conformation, as well as a good stallion. Every living thing brings forth after its kind, and the defects of the mother are more than likely to affect the offspring even if they do not actually reappear. In most cases the dam is as potent in influencing the offspring as the sire is. It is true that occasionally an inferior mare does bring a good colt, but this is the exception and not the rule. Get a mare of the size and conformation you want your horses to be, and then you can count on them coming up to the standard.

In breeding stock of this size and conformation, the farmer not only has the very best type for his own work, but he has something that will

always find a ready market, and that will bring the highest prices. By keeping this type of mare he is also able to raise large heavy bodied mules, for which there is great demand in the South. A pair of such mules often sell as high as $450 to $500.

II.—Selecting the Brood Mare.

We have already considered the size and conformation of the brood mare,' but there are many other points worthy of our attention.

The best time for selecting is while the mare is yet young, perhaps still a colt. Her ancestors should be known for two or three generations, and should be free from defects which horse flesh is heir to, if it is possible to have them that way. Then we may expect the young mare to develop into a sound animal.

The head should be carried high, indicating style and quality. It should be lean and broad between the eyes, which should be prominent and bright. The nose should be broad, nostrils large, jaw strong, ears fine and of medium size, gracefully carried.

The neck should be strong and muscular, and smoothly joined to the body. The shoulder should be smooth, and a little more upright than that of the light road or driving horse. The chest should be full and deep, avoiding narrowness behind the shoulders.

Good legs and feet are perhaps of more importance in a draft horse than any other organ. There is an old saying, "No foot, no horse," and anyone familiar with horses can see how true this is. A comparatively long and strongly muscled forearm, a broad cleanly jointed knee, smooth and deep fetlock, and a smooth pastern which is free from extra flesh, are desirable. The foot should be a medium sized one with a shape between that of a mule and a large flat horse-hoof. A hoof dark in color, with a concave sole and a large frog is the best, since the sensitive nerves and membranes are not so apt to become inflamed as in a flat foot with a low frog.

Mares or stallions that are injured through accident may be successfully used for breeding purposes, unless the injury is so great as to weaken the constitution. Mares that have been worked hard and are "worn out" usually do not make good mothers, even if they do breed all right, and ought not be used for breeding purposes.

III.—Care of the Brood Mare.

In caring for the brood mare all extra care and pains that may be taken will be well paid for. It is obvious that a mare that is not well cared for will not produce as strong and healthy a colt as one that is well cared for. Many little points, such as currying, regular feeding, salting, watering, etc., are more important than most farmers consider them to be. They count in the end and should not be neglected.

The time at which mares may be put to breeding depends on how early they become well developed, and whether they are being worked hard or not. A mare may be bred as early as two years of age, if she has been properly cared for, but it is best to wait until she is three years

old. She is then mature and will not be stunted, as might be the case with a two-year-old. However, when a two-year-old is bred it is then best to skip a year, causing her to bring her second colt when five years old.

The most fertile period of a mare's life is from three to twelve years. Some are reliable breeders until fifteen, but after that time they begin to wane. Yet a few mares may bring good strong colts until twenty or more years old. During this most fertile period mares should have plenty of work or exercise to keep the muscles firm, but no brood mare should ever be worked at continuous dragging labor.

As foaling time approaches the mare should be turned loose in a large box stall, or better still, be allowed the run of a large lot where she can get plenty of exercise. Care should be taken that nothing is left in the stall or lot in which the colt might become entangled when it comes. If possible, it is well to have running water in the lot, so that the mare may get it often and not too much at a time. If she gets grass during the day she should have a small bunch of clean hay at night. The other food should consist of boiled oats or barley with chopped hay or straw dampened with water. The boiled oats or barley is especially recommended if the mare has been worked up to within a few weeks of foaling time, otherwise it is not so necessary if she has good pasture. Corn is not a suitable article of food since much of it will produce too much heat and fat in the mare, and cause a general weakness and flabbiness of the muscles of the newly-dropped offspring. Any food which is likely to cause indigestion or to ferment should be avoided.

After foaling it is best for the mare to be fed on dry food for a few days and not allowed to graze. When the mare and colt do graze they must, of course, be sheltered from rain and cold at night. When the mare is not worked and is a good milker, a good pasture is sufficient for her requirements. When the pasture runs low, she should have an extra allowance of cut grass. Overfeeding should be watched also, as it may cause a good milker to give more milk than is necessary. In this case it would have to be milked off by hand. If the mare does not give enough milk the mammary glands should be stimulated by gentle rubbing. A good supply of easily digested food should also be given. Boiled oats or barley made into a mash with the addition of a little salt will help greatly to increase the milk flow. A good allowance of water will also help. If there is still not enough milk the colt should be fed sweetened cow's milk. Feed this several times a day, but not more than a pint at a time. After the colt becomes stronger skim milk without sugar may be substituted for the whole milk. One pint of oil-meal given the colt each day will prevent constipation and form bone and muscle.

When the mare is worked the colt may be allowed to follow, or it may be left in the stall or lot. When it is left in the stall the mare should

be taken in for it to suckle at least three times a day. See that she is not too hot when turned to the colt. It is best not to work the mare for the first two or three weeks after parturition.

IV.—Weaning and Caring for the Colt.

When the colt is first taken from its mother it should be tied in an adjoining stall that has an open partition, so they may see each other. In order that her milk may dry up, the mare's ration should be at once cut down to a small amount of oats and dry hay. The udder should be milked when full, but never milk it entirely dry. After a few days, when the milk has dried up, the colt may be entirely separated from the dam. Skim milk may still be given to the colt, and in addition clean, sound oats. If the weather is cold a little corn meal may be given each day to lay on fat and help keep up bodily heat. The pint of oil-meal mentioned above should be continued for some time after weaning. A good pasture with lots of room for exercise should also be furnished.

Exercise is very important in developing a strong, healthy colt. Many farmers have an idea that "roughing it" is the best method to develop hardiness and endurance, but an abundance of rich food and plenty of open-air exercise beats "roughing it" two to one. Yet it is a fact that rich food and no exercise is worse than poorer food with plenty of exercise.

From the very first the colt should be made to understand that you will not harm him. Never scare him or do anything to cause him to fear you. By gradual approaches his timidity is soon overcome, and he then begins to like to be rubbed or curried. He should be broken to the halter as soon as possible. Do not bridle and saddle him until he has been accustomed to the bit by means of the "bitting rig." The different steps in his breaking or training should be taken in a lot where the colt is familiar with the surroundings. If he is handled in a quiet, easy way, he should be no trouble to break.

HOT BED AND COLD FRAME FOR THE HOME GARDEN.

By O. M. WATSON, '15.

There are certain conditions of temperature, moisture and light that are most favorable to the growth of all varieties of vegetables and flowers.

By supplying these conditions we can "force" plants to grow "out of season."

Advantage of Forcing.

By the use of hot beds and cold frames, we can hasten the growth of many of the more tender vegetables and by this forcing we can, with greater ease, combat many insects

which injure the very young plants and which would not be such a menace after the plants have made a good start.

There are two simple methods of forcing plants for the home garden. One is the hot-bed and the other the cold-frame. The only difference between the two is that the hot-bed is supplied with heat and the cold-frame is not.

Location.

The hot-bed and cold-frame should be located at a place in the garden where the drainage is good and where they can get morning and midday sun. Put them out of the way and yet where they will be conveniently reached. The latter is very important as the beds or frames will need attention every day and should be so placed that as little time as possible need be taken up in attending to them.

Construction.

Dig a pit two feet deep and two feet wider than the frame will be and as long as you want it.

The object in having the additional width is to have the heating material extend beyond the frame.

Make a compost of rotting manure and straw or leaves. This should be well mixed by forking each day for three or four days. When it is steaming well, put it into the pit in layers about six inches thick. Wet each layer as it is put in and tramp it down well.

Put in three layers and then put on a six inch layer of good mellow soil. This soil should not be too rich, as too quick growth of seedlings is not desirable.

Now a frame can be made that has south side six inches high and north side eight inches high. If pit was seven feet wide, make frame five feet wide. After the frame has been put on, mound the earth up around it to give better drainage and exclude the air. The bed can be covered with sash or with canvas.

After the frame has been put on, moisten the earth but do not make it too wet. Keep a thermometer in the bed so that temperature can be noted.

For tomatoes, peppers, egg-plant, etc., the temperature should not go much below 60° F—or above 75° F.

When the bed has had time to settle well (three or four days) the seed can be planted.

As soon as the plants are up and have formed the first true leaves, they should be transplanted, in the bed, and set three inches apart each way. Do not let the bed get too dry but *be sure* not to get it too wet!

By raising the sash slightly, proper ventilation can be given. Whenever the weather is favorable remove the sash and let the plants get plenty of air.

By sinking two inch pots into the soil; melons of all kinds can be started and later transplanted to the garden.

For cabbage and lettuce, the hot-bed is not necessary as a temperature of 50 or 60° F is best for them.

Dont's.

Don't let the temperature get too high.

Don't keep too wet.

Don't crowd the plants too much.

EDUCATIONAL VALUE OF DOMESTIC SCIENCE.

By Mrs. OLIVE KIRBY BARNES, Special.

Before explaining the educational value of domestic science it is well to define the meaning of the word education. Usually, if a term is new, we are anxious to seek a definite meaning; but with terms used in everyday life, we often find it difficult to find a satisfactory meaning, just so with the word education. Miss Cooley quotes this definition, "Education of the individual is the process of adjustment to or participation in the world of social relationships and in the fund of social experience, the ideals and methods which those relationships conserve." The work of education in schools whether by handwork or otherwise is to help the student to see his relationship to the whole. Life and education really mean the same; through tradition we confine the latter term to a period of more formal, definite, and determinate adjustment.

Domestic science includes the study of all subjects which will bring about the happiest adjustment of life. One great purpose is the prevention of want and disease. How better can people be made happy, than by giving them appetizing, nourishing food. Domestic science teaches that there is a right way of preparing food in an economical way both in labor and cost and that work well done at home is not drudgery but an interesting absorbing occupation.

The increasing cost of food and clothes and the general change in living conditions have added so many difficulties to the housekeeping problem that it ranks among the skilled trades, requiring training of its workers. The Government recognizes the importance of teaching domestic science, in a substantial way by maintaining experiment stations, demonstration trains, traveling lecturers and free literature.

Efficiency is one quality demanded of the student and in its true sense means the ability to assume any responsible task that might suddenly arise and accomplish the work successfully and cheerfully, giving pleasure to all concerned. The girl is taught that this quality of efficiency is to be gained through good health and that the simplest way to obtain good health is care of herself and surroundings.

Far above the pecuniary reward for homemaker's work is the "labor of love." To know that each member of the household is better fitted for their own daily task through her earnest efforts, brings a reward not to be reckoned in money. A substitute can always be found for the office girl, but seek where you may you will not find one who can take the efficient homemaker's place in the home.

What better argument can be used to show the value of domestic science than that it is seeking, in the words of Frances Willard, "To make the whole world homelike" by training the girls to love an economical, healthful, beautiful, Christian home.

THE RELATION OF THE LIME AND MAGNESIUM CONTENT OF THE SOIL.

By JESSE M. SHAVER, '15.

In 1892, Oscar Loew published a report covering some experiments with lime and magnesia, in which he maintained that the lime and magnesia content of the soil should be in a definite ratio for the best results.

However, O Lemmerman, D. Myers, and Gossel made experiments independently of each other which led them to believe that there was no definite ratio between the line and magnesia in the most productive soils. O. Loew criticized their experiments because of the number of errors, which they allowed to creep in. Myer harvested all of his plants (eight varieties) before they were mature. Gossel used secondary sodium phosphate as a fertilizer which, as is well known, neutralizes the poisonous effects of magnesia to a certain extent.

Results similar to Loew's have been obtained by May of the Bureau of Plant Industry and by Mr. Giles of Porto Rico, as well as by several German investigators.

In Bulletin 1 of the Department of Plant Industry, Loew discusses the physiological effects of these salts on the plant cells; in which he seeks to account for these facts: First, That an excess of calcium causes a plant to exhibit phenomena of starvation; second, that an excess of magnesia causes the plant to die; and, third, that when the lime and magnesia are in a certain ratio, yields are at a maximum.

For a long time it has been known that either an excess of lime or magnesia was injurious to plant life. In 1814, Davy found that magnesia was injurious when in excess except in peat soils. He therefore advised the farmers to put peat on their soil. The real value of the peat lay in the amount of lime it contained. A little later in New Jersey there were two sources of ground limestone fairly close together; but in their use the farmers found that one was beneficial while the other was injurious. As a result samples were sent to Washington, where they were analyzed, and one was found to be calcium carbonate, while the other was dolomite, a calcium magnesium carbonate.

Heinrich of Germany, experimenting along this line found that an excess of magnesia was positively poisonous to plants and that an excess of lime (.46% in the case of lupin) was injurious.

There have been many theories advanced to account for the part that lime and magnesia play in the physiological processes of plants. Perhaps the best known of these is that of Loew of the United States Department of Agriculture. His theory in brief is as follows: The calcium unites with the nucleo-proteids of the plant cell to form calcium-nucleo-proteids which are necessary for the growth and reproduction of the nucleus and the organization of the chlorophyll bodies. The

value of the magnesium lies in the fact that it combines with phosphoric acid to form magnesium phosphate, which is very soluble, and gives up its phosphorous easier and quicker than any other phosphate found in plant tissue. The magnesium is movable i. e. it acts as a carrier only (a very small amount is used for food) and therefore can repeat its role over and over. In case of an excess of calcium and a deficiency of magnesium, the calcium phosphate is formed which is not easily broken up and as a result the plant starves from a lack of phosphorous. But if there is an excess of magnesia in the soil, the calcium-nucleo-proteids will be changed to magnesium nucleo-proteids and death will ensue. These salts—magnesium and calcium—can not be laid down in the plant cell (except in a very few cases) like starch. Where lime and magnesium are present, but neither is in excess, these injurious effects are not seen. From the above theory, it would appear that there should be some definite ratio between the calcium in the soil and the magnesiums for the maximum yield of crops.

In order to aid us in working out this ratio, it will be well here to consider the lime and magnesia requirements of different plants. The results as given below are an average and are given per hectare (2.5 acres) as reported in Vol. 1 of Ebermayer's "Chemie der Pflanzen."

Amounts of lime and magnesia extracted from the soil by different plants, (per hectare), are:

Plants	Lime Kilograms	Magnesia Kilograms
Cereals	16	10
Tobacco	30	15
Potatoes	40	20
Common Beet	40	27
Vine	46	17
Legumes	50	12
Pine Forests	70	9

Of course the available lime and magnesia must be much greater than that given above since the root hairs of the plant cannot come into contact with all of the soil particles.

In order to determine the best ratio between the lime and magnesia for maximum results, D. W. May of the Bureau of Plant Industry started a series of experiment: First, in water solution; second, in sand culture; third, in sand culture, and, fourth, in soil (Sea island cotton soil from North Carolina).

In the water solution, cow-peas were used, the results showing conclusively that the poisonous effects of magnesium are not seen when lime is used with the magnesium.

Lime and magnesium carbonates were used with the first culture solution (sand), the solution being as follows:

60 kilograms of clean, white sand.

Ca O as $Ca\ CO_3$	.4%
$P_2\ O_5$ as $Ca_3\ (PO_4)_2$	.2%
$H_2\ SO_4$ as $Ca\ SO_4$	.1%
$Fe\ SO_4$	.1%

To 30 kilograms of this, Magnesia as $Mg\ CO_3$, was added at the rate of .1%. To the other 30 kilograms, magnesia was added at the rate of 1%. The solutions were put up into twelve pots, holding 5 kilograms each and numbered from the minimum amount of magnesia 1A to 6A and 7B to 12B. In the first series (A)

the ratio of CaO to MgO is as 15 to 1; but in the second series (B) the ratio is as 3 to 5. On January 6, tobacco plants 5 cm. high were taken from rich soil, their roots washed, and transplanted into the pots. Those in series (A) grew rapidly; while those in series (B) stopped growing and turned yellow. On March 7, when the experiment was completed, the plants in series (A) were 16 to 20 cm. high; those in (B) were 3 or 4 cm. The experiments were continued with oats, barley, and beans with similar results. However, in one series an attempt was made to correct the defect by adding finely ground limestone. This did not have the desired effect. The explanation given was that the limestone was too insoluble. To test this theory a soluble lime salt, gypsum, was added. The plants regained their normal appearance and health. The conclusion seems to be that gypsum should be used to correct an excess of magnesia in the soil for immediate effect. However ground limestone or slaked lime may be used to good advantage.

The experiment with the other sand culture was to determine the exact ratio between the lime and magnesia for best yields. The culture solution was made up as follows:

30 kilograms of clean, white, sterilized, sand.

K_2HPO_4	.1%
KH_2PO_4	.1%
KNO_3	.2%
$(NH_4)_2SO_4$	.1%
$FeSO_4$	Trace

The culture was put into two series of eight pots each and lime and magnesia added in the following ratio with the result indicated: Wheat was planted July 11 and the result of the experiment taken August 6.

Pot No.	Magnesia	Lime	Growth	Conditions of plants.
A	.8%	.1%	6 cm	Bushy—Poorly developed.
B	.7	.2	6 "	Bushy—Poorly developed.
C	.6	.3	16 "	Bushy—Well developed.
D	.5	.4	16 "	Bushy—Well developed.
E	.4	.5	7 "	Poorly developed.
F	.3	.6	3 "	No root hairs.
G	.2	.7	3 "	No root hairs.
H	.1	.8	4 "	No root hairs.

Experiments were also carried on with other field crops which show that the average ratio of the lime to the magnesia in the soil should be as 7 to 4, actual weight, or 5:4 molecular weight. But in cereals the best ratio is found to be 1 to 1; and 2:3 in forage crops.

The practical side of this question for East Tennessee farmers comes in right here: Can we profitably apply finely crushed dolomite to our soils or must we procure limestone dust (crushed $CaCO_3$) or finely ground limestone to correct the acidity of our soils? The answer depends upon the amount of magnesia already in the soil. If there is a deficiency of magnesia add dolomite, otherwise use the calcium carbonate limestone. Our

Tennessee soils as analyzed by the Tennessee Experiment Station show an excess of magnesia. A total of twenty-six samples from all over the state were analyzed—fifteen soils, and eleven subsoils—and in fully twenty-one of these samples magnesia was found in excess. In Grundy County there was four times as much magnesia as lime.

Therefore in Tennessee, we should not apply dolomite or magnesia in any form (It is sometimes applied indirectly in Strassfurt salts, kainit, etc.) but should apply finely crushed limestone ($Ca\ CO_3$) or slaked lime so as to obtain the best ratio between the lime and magnesia and therefore obtain larger yields.

THE DEVELOPMENT OF THE DAIRY HEIFER.

By C. M. HUME, '14.

As with the majority of livestock questions, no set rules can be laid down for the best development of the dairy heifer. The suggestions given in this paper are taken from the recommendations of scientific investigators and the practices of successful dairymen. The stock man must use his own judgment in applying these suggestions to his individual conditions.

It is a disputed question, as to how long the calf should remain with the cow after birth, as this must depend upon the condition of both cow and calf. At any rate the calf should be fed its mother's milk for a few days at least. This is because the colostrum has a laxative and beneficial effect.

Feed 2 to 3 lbs. of whole milk at a feed, 3 times a day for from 4 to 5 days, then feed from 4 to 6 lbs. per feed, 2 times a day. The calf should be fed whole milk till from 7 to 10 days old. From then on gradually substitute skimmilk at the rate of ½ lb. per day so that at the end of a week's time the whole ration will be skimmilk. The experiment stations of Kansas, Wisconsin, Michigan and several others have shown that just as good calves may be raised on skimmilk as on whole milk and at about ¼ the cost.

Teach the calf to eat grain and hay as soon as possible. Begin by keeping hay and grain before it for several days when about 3 weeks of age. After the calf has learned to eat, give all it will clean up. Bran with a little corn meal is best at first, but later on a mixture of bran, whole oats and shelled corn is good and will give better results than the so-called "calf meals" now on the market and at much less expense. If available, it is well to feed skimmilk up to 6 or 8 months of age, but the general practice is to wean at about 3 months. If the skimmilk used comes from a whole milk creamery, it should be sterilized or at least heated to 180° before feeding. If skimmilk is not to be had, whey may be used to advantage.

If the pastures are good at wean-

ing time, little else is needed, but when on short pasture, or for a winter ration, give plenty of a leguminous hay, corn silage and a small amount of oats, corn and cotton-seed meal. A heavy feeding of grain at this time produces early maturity and increased size, but is too expensive for practical purposes. A light grain ration with plenty of nitrogenous roughages is the most economical. Speaking along this line Hæcker says "Protein the young heifer must have if she is to develop into a high producing cow." It has been claimed that a bulky ration developes a heifer with greater capacity, but this has as yet to be proven.

The age at which to breed a heifer depends upon the development of the individual and also upon the breed to which it belongs. A well developed Jersey may be bred to calve at two years of age, a Holstein at 30 months. According to a Danish experiment, reported in Hoards' Dairyman for May, 1913, heifers having their first calf at 2 years produced as much as 7 and 8 year olds as did those having their first calf at 3 years of age. Prolong the first milking period, as this gives the heifer a chance to develop. In his Book on "Dairy Cattle and Milk Production," Prof. C. H. Eckles of Missouri, says, "Our investigations show that during the last three months of pregnancy, a heifer, even when fed a liberal ration, does not add to her body weight." By prolonging the first milking period the heifer not only has an opportunity to develop bodily, but in the belief of many dairymen, the habit for continued milk is fixed to a large extent.

RAPE AS A FORAGE CROP FOR HOGS.

By GEO. B. ROBERTS, '14.

Much has been written in recent years on the value of different forage crops in hog production. Experiments at the various experiment stations have proven that the largest and most economical gains are to be had when forage crops are used in conjunction with concentrated feeds.

Such leguminous crops as clovers, alfalfa, cowpeas, and soy beans probably take highest rank as forage crops, not only because they have a high feeding value, but because they are "nitrogen gatherers" and consequently fit best into a particular rotation. But often the clover is not available as a pasture crop and in such cases it is both possible and economical to sow some quick-growing crop in the spring and summer that will furnish an abundance of pasture of almost the same feeding value as clover.

In case of drought or other failure of the clover crop, rape, when sown in the spring, will most adequately meet the needs for a summer pasture. Rape is a cool weather plant and under Tennessee conditions can easily be sown by the middle of March and

will give excellent results when broadcasted with oats at this time. The oats furnish protection for the rape, and if it is desirable to pasture early, hogs may be turned on in May to graze the oats. They will take to the oats first and gradually learn to eat the rape. Hogs are quite fond of rape when they are taught to eat it in this manner.

For a description of the rape plant it might be said that it is a member of the cabbage family and closely resembles the cabbage in appearance and manner of growth, except that the rape is headless and often grows to a height of $1\frac{1}{2}$ to 3 feet. It has large, coarse, succulent leaves, and under ordinary field conditions the strong-growing roots penetrate the soil to a considerable depth.

Rape is either annual or biennial. The annual or summer rape is grown extensively in Europe for its seed but has not been grown successfully in this country. The biennial or winter rape is the kind we grow in this country as a forage crop. Several varieties of the winter rape have been tried in the United States but of all the varieties the Dwarf Essex is the most widely cultivated.

Rape is a rank feeder and does best on fertile or heavily manured land. Old feed lots are well suited for its growth. The soil requirements for rape are about the same as that for corn.

The preparation of the soil for rape is somewhat similar to that for corn except when the seed are broadcasted care must be taken to get the soil well pulverized. The seed can be sown in drills with the rows 20 inches or more apart and the plant cultivated. Three or four pounds of seed are required per acre when sown in rows, while in broadcasting from five to seven pounds should be sown. Sowing in rows has some advantages over broadcasting. The plants can be cultivated to keep down weeds, and in pasturing the animals will follow the rows and not trample down and destroy so many plants.

As to the time of seeding, it might be said that early spring sowing will give best returns under Tennessee conditions. The writer would advise broadcasting 6 or 7 pounds of rape with a bushel of spring oats per acre about first to the middle of March. If the ground is naturally rich or well manured, good results are almost certain, provided the soil be well pulverized before seeding. Should the season be favorable the rape and oats can be pastured by the first of May, and by having several pastures so that the animals can be shifted, the rape will furnish pasture for the summer and fall months. If, however, it is desirable to have alternate lots for pasturing, successive planting could be made in the spring. But for late fall or winter forage the crop can be planted in August or September. Some farmers in Tennessee have reported quite favorably on August seeding.

When pasturing rape with large hogs they should not be turned on until the plants are 14 to 16 inches high. But when small pigs are used they can be turned on much sooner without injury to the crop. Care must be taken not to pasture too closely. Hogs will eat the leaves first and not injure the stems until the leaves are gone. If they are removed before injuring the stems the plants will put out leaves again and the

pasture be renewed. For this reason it is a good plan to have two pastures so that while the hogs are on one the other is growing. When it can be managed in this way the rape will furnish pasture for 15 to 20 hundred-pound hogs durisg a large part of the summer or fall.

To get the best returns with rape or any forage crop it is advisable to feed a grain ration while the animals are being pastured. Hogs fatten rapidly and keep in a healthful condition when fed on corn while running on rape. The rape has a high feeding value (the equal of red clover) and when fed with corn it makes a perfect ration.

Sheep and calves do well on rape pasture. Throughout the Northern states it is grown quite exclusively for sheep pasture. If care is not taken cattle and sheep may suffer very seriously from bloating. It is advisable to allow the animals to run on a grass pasture or give them a grain feed just before they are turned into the rape. Salt should be well supplied. There may not be very much danger from bloating when cattle or sheep are turned on for the first time as it is sometimes necessary for them to acquire a taste for the plant. They very quickly learn to eat it, however, and are quite fond of it afterwards. There is danger of the milk becoming tainted when milk cows are allowed to run on rape pasture. The plant contains an essential oil which renders it almost unfit for dairy cows. Some dairymen claim that small feeds may be cut and given to the cows immediately after milking without danger of the milk becoming tainted.

Rape is especially to be recommended to swine growers where an abundance of rich succulent forage is desired. Its advantages are the cheapness of seeding, and the seasons at which it may be planted or pastured. Rape seed can be purchased at 6 to 10 cents per pound, and the crop is planted at such a time that it can be followed by other crops should there be a failure. The plants can be pastured early in the spring or very late in the fall when there is usually a scarcity of green feeds.

CARE OF MANURE.

By T. H. DOUGHERTY, '14.

The proper care of manure is one of the great problems of farm management. There are a great many farmers who keep live stock for the good of the land and yet manage the manure in such a way that the land gets very little benefit. L. R. Neel, editor of the *Southern Agriculturist* speaks truly when he says, "If live stock is kept for the good of the land the place for the manure is out on the fields that produce the crops used for feed. The part that goes down the streams, that rots in the barnyard and fires under the sheds does them but little good."

The South spends $25,000,000 annually for commercial fertilizers. One-half of this amount could be saved if farmers would give attention to the careful preservation of the most valuable fertilizer of all—barnyard manure. It is not uncommon to see a farmer dust the sacks in the field that no commercial fertilizer be wasted and at the same time have smoking manure heaps in the barn lot with the ammonia going up with the sunshine and down with the drenching rains. In the first case he knew the value (at least by what it cost him) of the product; in the second, he did not. There are two things a farmer must know before he can realize the best results from his barnyard manure; (1) the value of manure, and (2) the nature of manure.

He must know that every ton of manure saved in good condition on his farm is worth from $2.00 to $5.00. He must know that something more than half the value of manure is in the liquid excrement and in order to save this he must see that his stalls are well bedded with some good absorbing material. Roberts has computed the value of the combined solid and liquid excrets to be nearly one-half the cost of the food. In his calculation, the value of the manure is based entirely upon its content of nitrogen, phosphoric acid and potash. He did not take into account the humus of which the physical and bacteriological effects upon the soil are extremely important.

But it is fully as important to know the nature of manure. Manure contains three important fertilizing elements: nitrogen, phosphoric acid, and potash. By far the most important of these is the nitrogen. This element is lost both by fermentation and by leaching. It is nitrogen in the form of ammonia that you see escaping from the smoking manure heap. It is all three that you see going off in the black "coffee" from the bottom of the heap. Fermentation and leaching, then, must be guarded against by the farmer who wishes to get the best results from his manure. Horse manure is a light, easily fermentable substance that readily loses its nitrogen, which passes off as ammonium carbonate. The dry fermentation is indicated by a whitish appearance of the interior of the manure heap. Owing to the watery nature of cow manure the loss of ammonia in the decomposition processes is much less than with horse manure. To preserve horse manure to the best advantage it should be mixed with cow manure.

The very best way to handle manure is to apply it to the field as fast as made. This prevents fermentation and allows the nitrogen and other elements leached from the manure to pass directly into the soil.

But on account of wet fields and other difficulties this is not always practical during the winter season. Then comes the question of how best to preserve this valuable by-product of the farm. There are at least two very good methods of doing this, (1) by leaving the manure packed air tight in the stable, and (2) by means of covered manure pits.

The first, like the growing of blackberries, is done almost entirely by the process of omission. It is only necessary to keep the moisture and bedding regulated and the horse himself will do the rest. There should not be too much bedding and the moisture

should be sufficient to keep out air and prevent fermentation. This is a very good plan when the stalls are large enough to hold the manure for a considerable length of time.

The manure pit is a necessity on any farm where live stock are kept. There must be some place for the manure dropped in the barn lot, for the waste manure under the barn shed and for the manure which must from time to time be taken from the stalls. The pit illustrated on the frontis of this issue of the FARMER is a good one for the average stock farm. The only thing is to build a square concrete pit, large enough to hold what manure you have, and place over it a good substantial cover. Dump your manure into this pit and moisten to prevent fermentation. The concrete prevents the leaching and the cover keeps out the rain and the sun. It is a good idea to let the cattle have access to the pit in order that the manure may be more firmly packed. The cow and horse manure should be dumped into the pit together.

These are simple directions for the care of manure, but if followed will cut the big fertilizer bill in two. The whole thing is simply this: save all the manure. Do not throw up any heaps of good barnyard manure to be decomposed and its best elements sent into the air or washed away by the rain.

SILAGE ON THE DAIRY FARM.

By F. R. HINES, '14.

The silo seems almost indispensable to economical and successful dairying. The best natural food for the cow is fresh grass, and when deprived of this, she may decrease in milk flow 25 per cent in one week. This decrease can be presented by having a constant supply of succulent food. Often the silo is more profitable during a summer drouth than at any time during the winter. With the best management possible, pasture and soiling crops fail sometimes for a few weeks in summer. If the dairymen could be sure of a never failing supply of soiling crops, a silo would never be needed, but on account of uncontrollable conditions this is impossible. The most successful dairymen are those who always have a good supply of silage on hand in case of such an emergency.

The following are some points in favor of silage:

More feed can be stored in a given space in the form of silage than in the form of fodder or hay.

There is a smaller loss of food material when a crop is made into silage than in the form of fodder or hay.

Corn silage is a more efficient food than corn fodder.

An acre of corn can be placed in the silo at less cost than the same acre can be husked and shredded.

Crops can be put in the silo during weather that could not be utilized in making hay or curing fodder.

More stock can be kept on a given area of land when silage is the basis of the ration.

There is less waste in feeding silage than in feeding fodder. Good silage properly fed is all consumed.

Silage is very palatable.

Silage, like other succulent feeds, has a beneficial effect upon the digestive organs.

Silage is the cheapest and best form in which a succulent food can be provided for the winter.

Three pounds of silage under average conditions is about equal to one pound of hay. If a cow is fed 30 pounds of silage daily it will replace 10 pounds of hay, but of course it should not entirely replace the hay.

In Wisconsin 248 cows fed silage were compared with 125 that had no silage. The silage reduced the cost of butter fat 4 cents per pound. Silage fed cows produced 5.9 per cent more milk and 7.8 per cent more fat. 24,440 pounds silage was obtained from 29,800 pounds green fodder and fed with 1,648 pounds of hay and 2,884 pounds of grain, while 7,330 pounds of field fodder was obtained from 29,800 pounds of green fodder and fed with 1,567 pounds of hay and 2,743 pounds of grain. The silage ration yielded 5 per cent more milk and 6 per cent more butter fat.

In Vermont 24,855 pounds of green fodder when converted into silage and fed with hay and grain produced 11 per cent more milk than when dried and few with the same amount of grain.

56,459 pounds of whole corn contained 19,950 pounds of dry matter. 34,496 pounds of stover silage contained 9,485 pounds of dry matter, and 9,122 pounds of ear corn contained 9,122 pounds of dry matter. The ear and stalk combined contained 18,606 pounds of dry matter or a loss of 1,344 pounds dry matter—nearly 7 per cent by handling separately instead of siloing the ears and all. The milk yield was 4 per cent higher on the whole corn silage and the yield of fat was 6.9 per cent higher with the same ration.

In another case the product of 6 acres fed to milk cows shows that corn siloed "ears and all" produced 3.3% better results than siloed stalk and ground ear corn from the same. When the milk and butter fat per acre is considered in either case, the whole corn silage from an acre of land fed with 4,313 pounds of hay (clover) and 2,157 pounds of grain produced 8,111.3 pounds of milk and 333 pounds of fat, while with stover-silage with ground ears from the same, and the same amount of hay 6,399 pounds of milk and 264 pounds of butter were produced; that is, it would take 1.26 acres extra to give an equal amount of milk and milk products in the latter case as was produced by the silage from the whole corn lot.

Dairymen who depend upon pasture in summer and in winter feed cotton seed meal in connection with hulls, corn stover or a poor quality of meadow hay, are usually doing only a summer business. During the winter month their herds go into winter quarters and are frequently not paying for their keep, owing to the low average production in conjunction with a high average cost. One herd of 23 cows on silage and cotton seed meal compared with 247

on a dry ration, shows the cows fed the dry ration during the winter dropped on an average of 117.5 pounds or 13.67 gallons, while the average production of the 23 cows on the silage ration dropped only 29 pounds or 3.38 gallons, showing a net difference in favor of the silage ration of 88.5 pounds or 10.29 gallons per cow per month. Silage then increased the production of milk 36.81 per cent or over one-third. In a herd of 20 cows, if each cow produced an increase of 10.29 gallons per month or 205.8 gallons, in 3 months it would be equal to 617.4 gallons. If the average price of milk is 30 cents per gallon, the 617.4 gallons are worth $185.22. Where is the excuse for sending our herds into winter quarters when instead each cow may be earning a profit of $3.09 per month?

Corn and sorghum are generally considered the best crops for the silo but a great variety of crops may be used. Corn and sorghum may be put into the silo at a cost of about $2.00 and $1.50 per ton respectively. Corn is generally placed first because of its higher nutritive content and possibly is better adapted to general use, but in the South it has a close rival in sorghum. Corn forms the best kind of silage for cows because it does not affect the flavor of the milk and butter as sorghum sometimes does. The yields of corn are not so large as those obtained from sorghum, and general observations lead to a belief that, with the exception noted above, sorghum is practically as valuable for silage as corn for dairy, and beef cattle as well. Sorghum also gives much larger yields, possibly 1½ times as much, and is more resistent to drouth while it is just as easy to cultivate and handle as corn. There is a general belief that sorghum produces a sour silage and is therefore an unsatisfactory crop, but this is a mistaken idea. In many instances persons who have attempted to make silage from sorghum, and as to that matter from corn, have put the crop into the silo too green. The results have been sour silage. If the sorghum is allowed to mature, that is, to develop a well-filled seed head, and is then put in a properly constructed silo, it makes as sweet and as palatable silage as can be produced from any crop. Sorghum also remains in a proper stage for siloing for a longer period than corn, allowing more time for harvesting and filling the silo.

NEWS.

Experiment Station Cows in Register of Merit. Over a year ago the Tennessee Experiment Station began an official testing of cows for the Register of Merit. The results are pleasing. Recently three more cows were admitted to the four formerly admitted, making a total of seven. The seven have an average production of 10,704 lbs. milk and 467 lbs. butter with an average age of 4½ years.

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Mr. R. C. Briggs has returned from a prolonged visit to Jackson, Tenn. While there he saw to the pruning of about 2,200 apple, pear, and peach trees.

THE U. T. FARMER

Scientific; therefore practical

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EDITORIAL.

Any region or country that has the dairy industry developed to a high stage is a place of fine farms and highly productive soils. In some of these places dairying has become the leading industry on account of the producing quality of the soil, but in most of the cases the opposite is true, that is, the soils have become fertile on account of the large number of cattle in the region. This direct connection between the number of cattle and soil fertility must be explained by the great value of manure as plant food.

Every farmer knows the importance of having rich soil and he also knows the part which manure plays in soil fertility; yet, from the common methods used in caring for and handling manure we must conclude that he does not give the subject sufficient attention.

Some of the less progressive farmers do not care for the manure at all. That which is dropped in the feed lot is left from year to year. That dropped in the barn is thrown through a hole in the wall and left under the drippings of the barn until rotted. This is the very poorest practice and, as a result, is found on the very poorest farms.

A much better practice is that of leaving the manure in the stalls until ready to take to the field. By some it is thrown into piles in the field and left for several weeks before distributing; but this, again, has its serious disadvantages. There is a great saving of labor and of plant food by spreading directly.

Another method of handling manure is the "manure-shed" plan. This is the most up-to-date method and in dairying, especially, is by far the most satisfactory. For horses and fattening cattle the "stall to field" plan may be used with equally good results and with far less labor; but in dairying where the manure must be taken from the stall daily there is nothing that will beat the manure shed. Some dairymen load the manure directly onto a spreader or wagon and haul each day; but

this daily hauling is a waste of time. All things considered, then, the "shed" plan of keeping manure until ready for the field, seems to be the best. This means that a manure shed should be on every farm where there is any appreciable amount of manure made.

Until our farmers realize the importance of manure in the up-building of the soil, and take every precaution to return as much plant food to the soil as possible, the average crop yield of our states will never increase. And if our crop yields do not increase, it will be only a short time, if the present rate of population growth continues, until the effects of our negligence in regard to soil fertility will be sorely felt. The only rational way to prevent any ill outcome is to take preventive measures soon enough—and when we consider the cost of living we cannot begin too soon. The most far-reaching preventive measure is to increase crop yields by increasing fertility. If all the manure over the whole South were conserved as well as possible by proper method of handling, the results in only a few years would certainly be felt in increased yields.

Now is a good time to begin planning and making preparations for the home vegetable garden. It is too important a feature on every American farm to be neglected. We are told that the products from our home gardens amount to millions of dollars annually. The value of such a garden is so well recognized and so evident that it is almost an insult to remind you of it.

But the home garden has other values than those of a monetary character. It has been appropriately termed the "farm drug store,"—a place where you may go daily for clean, fresh, and wholesome vegetables. City people who buy their vegetables at the stores don't really know what good, fresh, tender, juicy vegetables are like. A few hours in a store will make a vast difference in some vegetables in the matter of sweetness. Sweet corn for instance loses its sugar rapidly and to be enjoyed at its best must be taken fresh from the garden. A home garden has so many advantages it is difficult to understand why everybody don't have a garden of some kind. Aside from its advantages of supplying the family with a variety of healthful foods during the greater part of the year, a good garden contributes to the health and pleasure of those who care for it. This is especially true for the weary business or professional man or the tired housekeeper. When the work is properly managed it is equally attractive to boys and girls. The cultivation of vacant lots by the youth in our towns and cities should receive every possible encouragement. Such work is being done in many of our large cities to-day, and with admirable results. Columbus and Cleveland, Ohio, furnish good illustrations of what can be done along this line. Make your plans now. Don't wait till the busy days of spring to do your planning and to make your preparations. In planning this garden we wish to suggest that the following aims be kept in mind: (1) The production of a liberal, uniform and constant supply of vegetables preferred by the members of the family for whom they are grown. (2) In the selection of variety, quality should

have first consideration. (3) There should be as great a variety as possible. The prevailing tendency is to restrict the plantings to the most common vegetables. This plan should be broadened, and the values of the garden increased by the addition of crops less generally grown.

In the November issue of the Farmer our readers' attention was called to the San José Scale and he was advised to make a close search for the pest. If the scale was found preparation should be made to spray about the end of February. The preparation of the spray was given in the November number.

Winter is the time to plan the summer's work and to make preparation for the spring rush. Plans should be made as to what and where to plant; fertilizers should be bought and mixed; manure should be hauled out; seed should be bought; and all tools should be repaired. The corn, if home grown seed is to be used, should be carefully picked and graded and if desirable, germination tests may be made. Do as much of your spring and summer work as possible during winter.

NEWS.

Professor Morgan in Canada. The Ontario Agricultural College has made an annual event of having an Agricultural Meeting some time in January. At this meeting it is customary to have a visitor equal to the occasion to make an address. The President of the College who used to be an old classmate of Professor Morgan's kindly invited him as the speaker of the occasion this year.

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Mr. H. P. Ogden, '13, was here a few weeks ago selecting good text books on agriculture to use in his school at Clarksville.

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The fifteenth annual two months short course began January 19th with good attendance. Students are here from all over the State, many of whom have come as a result of the weekly short course. The first month is devoted to courses in soils, fertilizers, general farm crops, and live stock production. There are at present about 75 students for these courses. The second month will be devoted to Horticulture and Dairying.

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The weekly short course that began last October finished its itinerary January 17th. The attendance of the fourteen short courses averaged above 100, the best attendance being at Dresden—the last meeting. The attendance was also good at Camden, Franklin, Dayton, Crossville, and Union City.

Professor Keffer says, "that the interest manifested mostly throughout the courses was in soil fertility and the growing of live stock, and everybody wanted to know how to grow alfalfa." He also finds "that there is increasing interest in the State on winter-pastures and how to grow green manures." It is an evident fact that the courses were particularly successful and beneficial everywhere held.

Mr. R. Murphy, '09, now a successful dairyman near Knoxville and Mr. J. C. McAmis, '12, now County Demonstrator of Obion County, assisted in the Short Course work over the State. We are glad to get the report that they proved very efficient in this kind of work.

Last week the first Mid-Winter Fat Stock Show of East Tennessee was given in Temple Hall at the Experiment Station. Premiums to the amount of $1,000 were given. Premiums were given on Short Horn fat steers, Angus, Herefords, and Grand Champion fat steer. Swine that received premiums were Poland China, Duroc Jersey, Berkshire, and Grand Champion fat barrow. For sheep premiums were given to medium wool, coarse wool and Grand Champion fat weathers.

The animals were on exhibit from Monday noon, January 26, till Saturday noon, January 31. All exhibitors were residents of East Tennessee. The main purpose of this show is to stimulate the production of live stock in East Tennessee. The movement is certainly a progressive one and all farmers of this section should take advantage of it in the future.

At the last meeting of the Agricultural Club the following officers were elected:

C. M. Haenseler—President.

G. B. Thackston—Vice-president.

J. L. Herron—Sec. and Treas.

F. W. Fleming—Critic.

T. H. Dougherty—Sergeant-at-Arms.

At this meeting it was decided to entertain the "Short Horns" with a reception Tuesday night, February 3, in Morrill Hall. This reception is given each year to the short course students and it has always been very effective in bringing them in closer touch with the regular students and to make them feel more at home while here.

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Why don't you raise sheep, when you know this country has 43 millions sheared each year, yielding 289 millions of pounds of wool, worth 65 millions of dollars.

———:———

Tennessee is growing more cotton. Wonder if she can continually increase as she did last year. In 1913, 375,000 bales were produced in Tennessee while only 276,546 bales were produced in 1912.

A Notice to U. T. Farmer Readers: Our Advertisers handle the Best in their respective lines. It will pay you to patronize them.

SHORT COURSE SCHEDULE.

SCHEDULE OF CLASSES.

Horticulture, Dairying, and Engineering. February 16 to March 14, 1914.

(Initials after subject stand for name of instructor):

S. M. B.—Bain; B.—Bentley; A. B.—Benzli; C. R. C.—Coleman; C.—Cotton; E.—Essary; F.—Ferris; J.—Jacob; K.—Keffer; M.—Mooers; H. A. M.—Morgan; M. M.—Mulvania; R. M. M.—Murphy; C. A. S.—Sullinger; B. L. T.—Thomas; V.—Voorhees; W.—Willson.

Monday, February, 16.

8:00-10:00—Farm Machinery, Sec. 1—A. B.; Forge Shop, Sec. 2.—B. L. T.
10:15-11:15—Truck and Farm Crops. K.
11:15-12:15—Dairying in Tennessee. R. M. M.
12:15- 1:15—Plant Life: Roots. S. M. B.
2:15- 5:15—Excursion to City Milk Plant. R. M. M.

Tuesday, February 17.

8:00-10:00—Farm Machinery, Sec. 2. F.; Forge Shop, Sec. 1. B. L. T.
10:15-11:15—Fertilizers for Truck Crops. M.
11:15-12:15—Dairy Rotations. R. M. M.
12:15- 1:15—Garden Insects. H. A. M.
2:15- 3:15—Plant Life: Stems. S. M. B.
3:15- 5:15—Seed-sowing: Laboratory. K.

Wednesday, February 18.

8:00-10:00—Water Supply and Water Power. Sec. 1. S.; Forge Shop, Sec. 2. A. B., B. L. T.
10:15-11:15—Irish Potato. K.
11:15-12:15—Truck Soils. M.
12:15- 1:15—Market Distance and Dairying. R. M. M.
2:15- 5:15—Judging Dairy Cattle. R. M. M.

Thursday, February 19.

8:00-10:00—Concrete Work (at Farm). C. A. S.
10:15-11:15—Truck Soils. M.
11:15-12:15—Keeping Herd Records. W.
12:15- 1:15—Principles of Pruning. K.
2:15- 5:15—Grape Pruning. K.

Friday, February 20.

8:00-10:00—Water Supply and Water Power, Sec. 2. S.; Forge Shop, Sec. 1, A. B., B. L. T.
10:15-11:15—Strawberry. C. R. C.
11:15-12:15—Commercial Fertilizers. M.
12:15- 1:15—Milking. R. M. M.
2:15- 5:15—Judging Dairy Cattle. R. M. M.

Saturday, February 21.

8:00-10:00—Seed Selection and Planting. K.
10:15-11:15—Fertilizers and Manures. M.
11:15-12:15—Plant Life: Leaves. S. M. B.
12:15- 1:15—Herd Management. R M. M.
2:15- 5:15—Excursion to Market Gardens. K.

Monday, February 23.

8:00-10:00—Farm Machinery, Sec. 1. A. B.; Forge Shop, Sec. 2, B. L. T.
10:15-11:15—Hotbeds and Cold-frames. K.
11:15-12:15—Manures for Dairy Crops. H. A. M.
12:15- 1:15—Dairy Barns. R. M. M.
2:15- 5:15—Babcock Milk Test. R. M. M.

Tuesday, February 24.

8:00-10:00—Farm Machinery, Sec. 2, F.; Forge Shop, Sec. 1, B. L. T.
10:15-11:15—Succession Truck Crops. K.
11:15-12:15—Planning the Dairy Farm. W.
12:15- 1:15—Growing of Grains. H. A. M.
2:15- 3:15—Fertilizers for Orchards. K.
3:15- 5:15—Hotbed Practice. K.

Wednesday, February 25.

8:00-10:00—Water Supply and Water Power, Sec. 1, S.; Forge Shop, Sec. 2, A. B., B. L. T.
10:15-11:15—Tillage Crops for Orchards. K.
11:15-12:15—Soy Beans and Other Legumes. H. A. M.
12:15- 1:15—Companion Truck Crops. K.
2:15- 5:15—Dairy Practice: Separating. R. M. M.

Thursday, February 26.

8:00-10:00—Concrete Work (at Farm). C. A. S.
10:15-11:15—Grapes. K.
11:15-12:15—Dry Feed Rations. R. M. M.
12:15- 1:15—Dairy Sanitation. J.
2:15- 5:15—Pruning Neglected Vines. K.

Friday, February 27.

8:00-10:00—Water Supply and Water Power, Sec. 2, S.; Forge Shop, Sec. 1, A. B., B. L. T.
10:15-11:15—Rotations for Truck Crops. K.
11:15-12:15—Diseases of Dairy Cattle. J.
12:15- 1:15—Balancing Succulent Rations. R. M. M.
2:15- 3:15—Composition of Milk. W.
3:15- 5:15—Testing Separators. R.M.M.

Saturday, February 28.

8:00-10:00—Propagation by Cuttings. K.
10:15-11:15—Asparagus. K.
11:15-12:15—Diseases of Dairy Cattle. J.
12:15- 1:15—Feeding Cotton-seed Products. R. M. M.
2:15- 5:15—Visit to Strawberry Farms. K.

Monday, March 2.

8:00-10:00—Farm Machinery, Sec. 1, A. B.; Forge Shop, Sec. 2, B. L. T.
10:15-11:15—Orchard Sites and Tillage. K.
11:15-12:15—Protein Supplies in Legumes. R. M. M.
12:15- 1:15—Diseases of Dairy Cattle. J.
2:15- 3:15—Milk Secretion. R. M. M.
3:15- 5:15—Testing Acidity of Milk. R. M. M.

Tuesday, March 3.

8:00-10:00—Farm Machinery, Sec. 2, F.; Forge Shop, Sec. 1, B. L. T.
10:15-11:15—Cabbage and Cauliflower. K.
11:15-12:15—Peach Insects. C.
12:15- 1:15—Diseases of Dairy Cattle. J.
2:15- 5:15—Peach Tree Pruning. K.

Wednesday, March 4.

8:00-10:00—Water Supply and Water Power, Sec. 1, S.; Forge Shop, Sec. 2, A. B., B. L. T.
10:15-11:15—Selection and Care of Nursery Stock. K.
11:15-12:15—Milk Secretion. R. M. M.
12:15- 1:15—Diseases of Dairy Cattle. J.
2:15- 5:15—Butter Making. R. M. M.

Thursday, March 5.

8:00-10:00—Concrete Work (at Farm). C. A. S.
10:15-11:15—Melons. K.
11:15-12:15—Tomato. E.
12:15- 1:15—Bacteria and Farm Sanitation. M. M.
2:15- 5:15—Pruning Trained Apple Trees. K.

Friday, March 6.

8:00-10:00—Water Supply and Water Power, Sec. 2, S.; Forge Shop, Sec. 1, A. B., B. L. T.
10:15-11:15—Bacteria in Relation to Sweet Milk. M. M.
11:15-12:15—Life-History of Scale Insects. C.
12:15- 1:15—Bacteria in Butter Making. M. M.
2:15- 5:15—Butter Making. R. M. M.

Saturday, March 7.

8:00-10:00—Budding. K.
10:15-11:15—Sweet Potatoes. K.
11:15-12:15—Milk Ferments. R. M. M.
12:15- 1:15—Common Truck Insects. H. A. M.
2:15- 5:15—Pruning Neglected Apple Trees. K.

Monday, March 9.

8:00-10:00—Farm Machinery, Sec. 1, A. B.; Forge Shop, Sec. 2, B. L. T.
10:15-11:15—Separation and Ripening of Cream. R. M. M.
11:15-12:15—Bacteria in Cheese Making. M. M.
12:15- 1:15—Cheddar Cheese. R. M. M.
2:15- 5:15—Making Cheddar Cheese. R. M. M.

Tuesday, March 10.

8:00-10:00—Farm Machinery, Sec. 2, F.; Forge Shop, Sec. 1, B. L. T.
10:15-11:15—Top Grafting. K.
11:15-12:15—Butter Making. R. M. M.
12:15- 1:15—Spraying for Scale. B.
2:15- 5:15—Spraying Demonstration. B.

Wednesday, March 11.

8:00-10:00—Water Supply and Water Power, Sec. 1, S.; Forge Shop, Sec. 2, A. B., B. L. T.
10:15-11:15—Cheddar Cheese. R. M. M.
11:15-12:15—Trucking and Weather. V.
12:15- 1:15—Harvesting Fruit. K.
2:15- 5:15—Making Neufchatel Cheese. R. M. M.

Thursday, March 12.

8:00-10:00—Concrete Work (at Farm). C. A. S.
10:15-11:15—Marketing Fruit. K.
11:15-12:15—Dairy Breeding. W.
12:15- 1:15—Propagation of Fruit Trees. K.
2:15- 5:15—Root Grafting the Apple. K.

Friday, March 13.

8:00-10:00—Water Supply and Water Power, Sec. 2, S.; Forge Shop, Sec. 1, A. B., B. L. T.
10:15-11:15—Bramble Fruits. K.
11:15-12:15—Orcharding and Weather. V.
12:15- 1:15—Cherry, Plum and Pear. K.
2:15- 5:15—Spraying Practice. K.

Saturday, March 14.

8:00-10:00—Review: Dairying.
10:00-12:00—Review: Horticulture.

THE U. T. FARMER

Lady Woodcrest Colantha Lad, West Tenn. Exp. Sta. Holstein.
Record: 13,294 lbs. milk in 1 year.

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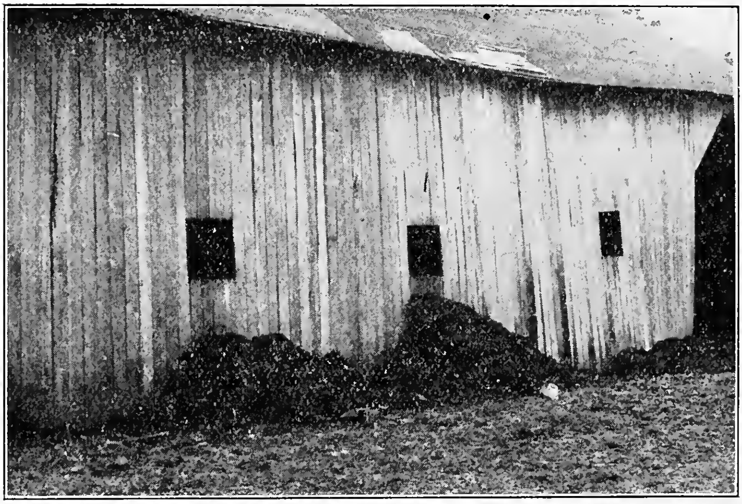

Are Your Profits Leaching Away? Take care of the Manure; it means better crops.

THE U. T. FARMER

Vol. 8. MARCH, 1914. No. 6

THE NEED OF MORE DAIRY COWS IN TENNESSEE.

By JOHN B. BAKER, '16.

The farmer of Tennessee through years past has not had to do intensive farming. He was naturally blest with extensive and fertile fields; his needs have been small, and a fair income easily appreciable. Today, however, things are different. The population has increased, land has become more valuable and the cost of living has likewise increased. We find that there is a demand for greater crops, and yet, when we turn to our soils we discover that they have become depleted of plant-food elements and humus, making it impossible for these crops to be grown. By selling grain crops off the farms our once fertile soils have become poor. Conservation of soil fertility has been conceded to be the greatest problem of agriculture. No agricultural district can thrive and not heed this problem. How then are we to cope with it? The only reasonable way is to grow more live stock, send our farm products to market in as small a package as possible, and retain as much organic matter and plant-food elements, to be returned to the soil, as possible.

By experiment it has been shown that from 50% to 80% of the plant-food elements taken from the soil in crops can be returned to the soil, if fed to live stock and their voidings saved. But this does not tell all of the story. Most live stock men are buyers rather than sellers of grain and feeds, and by this means add constantly to the fertility of their soil. To make the matter a little more plain, let us look at some figures. Let us say there is 50 bu. of corn and 3 tons of stover grown on an acre of soil. This corn and stover is known by analysis to contain 98 lbs. of nitrogen, 13 lbs. of phosphorus, and 60 lbs. of potash. Calculating the value of these fertilizing constituents on a basis of nitrogen 20c per pound, phosphorus and potash at 6c per pound, we have $23.98 worth of fertilizer. This amount then is a total loss when the grain and stover are sold as such. When the grain alone is sold and the stover turned under there is a loss of about $10 in fertility. But when this same amount of grain and stover is fed to live stock and sold as meat we have a loss of only 15 lbs. of nitrogen, 3 lbs. of phosphorus, and 9 lbs. of potash or a value in fertilizer amounting to $3.49. The figures are more striking than this when we feed our crops to dairy cows. 5000 lbs. of corn or 90 bu. in round numbers, when sold as grain takes from the soil $19 worth of plant-food elements. When we feed this amount of corn to dairy cows and sell the cream from the milk

produced, only 40c worth of fertility is lost. A ton of milk sold at $1.50 per hundred is worth $30; as a fertilizer it is worth $2.56. Butter at 30c per pound is worth $600 per ton, as a fertilizer it is worth only 64c. A dairy cow weighing 1000 lbs. voids about 12 tons of solid and liquid manure in a year worth, on the basis of fertility contained, $30 in round numbers. The dairy farmer usually buys more feeds rich in plant-food elements than other live stock farmers and, therefore, adds more to his soil fertility. We see from these calculations that, from a fertilizer standpoint, not only live stock in general are a great benefit to the farmer, but that the dairy cow is especially valuable.

The time has come for Tennessee farmers to do more intensive farming; and with intensive farming the dairy cow must from necessity hold first place among live stock. She is the most economical producer of human foods we have. Let us for example compare her products to a fat steer as to the edible and digestible food of each. A fairly good dairy cow will produce in her milk in one year 700 to 800 pounds of dry matter all of which is edible and digestible; some cows will almost double this amount. The steer with a live weight of 1250 contains 56% of water in his carcass, leaving 548 pounds of dry matter, only a part of which is edible, for this includes bone, hair, offal, etc. From this, then, we see that the dairy cow produces in one year about three to four times as much edible solids as the fat steer, for a steer weighing 1200 lbs. is usually over two years of age.

To show further the need of more dairy cows in Tennessee, let us compare her with one of her sister states, which is very little larger, as to agriculture. Thirty years ago Wisconsin had about the same number of live stock as Tennessee. Today Wisconsin has 1,683,545 more live stock than Tennessee. Almost all of this difference is due to the number of dairy cows in Wisconsin. Wisconsin has nine cows to a farm while Tennessee has only 1.8. In 1900, Wisconsin had 2,018 creameries, butter and cheese factories while Tennessee had only 12. In 1880 the average production of wheat in Wisconsin per acre was 23 bus. while in Tennessee the average production per acre was 16.2 bus. In 1910 Wisconsin produced an average of 30.4 bus. per acre, giving an increase of 7.4 bus. in 30 years. In 1910 Tennessee produced an average of 19.1 bus. per acre or an increase of only 2.9 bus. in 30 years. From these facts we see what the dairy cow is doing for Wisconsin. The difference in these yields of wheat is due to the 30 to 50 million of dollars worth of manure which Wisconsin is putting on her soils more than Tennessee. Why should the dairy cow not do for Tennessee what she is doing for other states? Wisconsin is not as well situated as Tennessee for carrying on the dairy industry. She has to go into winter quarters earlier, she must have far more expensive barns, she does not have as long season for pasturing and has to buy more high price feeds than Tennessee. Furthermore, Wisconsin sells a large portion of her dairy products in Tennessee markets. So it can't be said that our markets are poor.

C. H. Eckles in his book on milk production says, "It is a well-known

fact that the most prosperous agricultural nations and communities today are those in which the dairy cow is the foundation of agriculture. To prove this we only have to compare Russia with Denmark, Spain with Holland and those states of the United States which have a great many dairy cattle with others which have only a few." If Tennessee would wake up to this fact there is no doubt but what our agricultural interests would be greatly improved.

CARING FOR THE SICK AND CONVALESCENT.

By MISS ADELA HAENSELER, '15.

Since the days of greater enlightenment in the science of right living, disease has been greatly reduced. And it is one of the noblest works of the Home Economics movement to spread this knowledge into every home even in the remotest nooks and corners of our country. But until such time when everyone shall know these facts, and not only know but act according to this knowledge, disease will find its way into the home at some time or other. Since it is so, people must be prepared to meet the emergency.

As soon as the patient shows symptoms of some of the more serious diseases, a physician should be called. But before he comes it falls to the lot of some one of the members of the home to act as advisor and nurse, and the more efficient she is the more speedy will be the recovery of the patient. If the case promises to be a prolonged one a separate room should be arranged. If the house is too small to afford a spare room for the sick, one of the regularly used bed-rooms may be selected. The room should be on the sunny side of the house and have plenty of windows for ventilation. As many of the articles of furniture as possible should be removed, all useless curtains and hangings, and bric-a-brac on mantels and shelves taken out. The table covers and bed should be spotlessly white and of plain linen. Everything which might catch dust and disease germs must be removed as far as possible.

The room should have no carpet on the floor as they are hard to keep sanitary. Rugs may be placed in those places where most of the walking is done to assure more quiet. These should be aired and sunned every day to kill all disease germs. The room should, however, be attractive and its very neatness and cleanliness will assure this. A picture hung where the patient can easily see it and changed from time to time gives variety to the monotony of the close confinement. The patient can be so placed that he can easily see out of the window and so enjoy some of the outdoor life in which he can not himself participate. The eyes should however never be taxed and the room must be darkened by shades which are restful to the eyes. A good shade of dark green is restful to most eyes, but people are psychologically different and some may need some other color to sooth them.

When the physician comes and

cares for the patient, do as he says do. Do not mix home or quack doctoring with his art. He has studied the case and knows what to do better than the accidental visitor who drops in and urges the use of some special remedy which cured such and such a person of her knowledge. Even if the doctor is wrong do not meddle with his advice, for the medicine which he gives may be in direct opposition to the home treatment and dangerous complications may result. If the doctor does not seem to reach the case get another one, but follow the directions of the physician in charge.

In some homes a trained nurse is procurable but the average family does not feel able to hire one and it falls to some of the family to act in her stead.

The nurse should be cheerful and bright when in the sick room, and the better and more carefully she attends the patient the more ready will be the recovery. As much depends upon nursing as upon the medicines. She must give the medicines at the right time and study how to handle the sick to disturb him as little as possible. There is an art in making the bed which can be acquired only by practice. The sheet must be rolled up to the side of the patient, and the clean sheet spread on this part and also rolled up. Then the patient is turned on his side on to the clean sheet, the soiled one removed and the clean one spread on the other side. It must be spread perfectly smooth so no wrinkles will annoy the patient.

The room should be kept as quiet as possible and all the good hearted friends and neighbors who come to visit should be modestly told that it is for the better that they sit in some other room and only see the patient for a few moments. The common country practice of having a great crowd of men and women and even children in the sick room often telling horrible tales of sieges of sickness through which they themselves had passed is a menace to the health of the sufferer and should not be tolerated.

The diet of the patient is very important. The physician will generally say what the patient may eat but the nurse must know how to prepare the food. If he orders gruel be sure that it has cooked two hours and is made attractive by the addition of seasoning and hot milk. Beef broth must have all the fat removed as fat is often nauseating to the patient. If the nurse does not know how to cook for the invalid let her look in the family cook book. She will very likely find some good recipes there. Be sure to follow the recipe; if it says cook two hours do not stop with an hour and a quarter. The digestion of the patient is very much weakened and he needs the very best that can be prepared for him. The attractiveness of the tray has very much to do with the digestion and appetite of the sufferer. Have the tray the right size to hold the dishes. Cover with a spotless napkin.

Arrange a plate, silver, napkin and glass of water just as for the table. Serve the food just as daintily as possible, being sure not to serve too much. A small amount of food daintily served stimulates digestion but a large amount may have an opposite effect.

A fresh flower on the tray, a change in the china, different ways of serv-

ing the same food, may all be resorted to, to make the meal attractive and pleasant.

Every extra painstaking effort which the nurse puts forth to make the period of illness and convalesence more pleasant and comfortable for her patient will help in that much to hasten his recovery besides doing him and herself the favor of cheering otherwise dreary hours.

TIMELY TOPICS.

By JESSE M. SHAVER, '15.

A farmer near Knoxville has a unique way of raising early radishes in the open. He selects a hillside in the wood-land facing to the south or southeast, if obtainable, and here he prepares his seed bed. The underbrush is removed and the land disked as thoroughly as possible between the trees. Then the seeds of some early variety, which meets the market requirements are sown, broadcast, and barely covered by brushing or using a light drag harrow. In a very few weeks these are ready for market; the trees serving to protect them from the frost and winds. The fact that they are planted among the trees does not injure their nourishment much, since the trees have not yet really started to grow after their winter sleep. A location such as described will produce much earlier radishes and that is just what you want for the early market. How about trying a small plot this spring?

If you have not already planted your English peas and early potatoes, do so at once. For early peas the dwarf smooth varieties are preferable, because of their earliness. Irish potatoes should also be planted now. Bliss Triumph is one of the best varieties for Tennessee. Early Rose is a later potato and also a heavier yielder. In market gardening it pays to take a risk for early crops. The early vegetables always bring top prices. If you are not running a market garden, it is well to see that early vegetables are planted in the home garden. Spinach, green onions, and turnip greens taste mighty good in the spring, and early rhubarb sauce! my! Are you going to have these early appetizers on your table this spring? If not, it is your own fault. Resolve now to plant some spinach and some seven top turnip seed next fall for early spring greens; and don't forget to bed a few rows of onion sets. Our home garden is one of our most important adjuncts on the farm and yet how often we neglect it; possibly leaving it to be tended by "the good woman" and the children. Take an interest in this part of the farm and always have a big variety of vegetables for the table. It pays in the long run.

Have you ever tried giving some of that old, bothersome chick-weed growing in the garden to the pigs and fattening hogs? They enjoy it very much. It is good for them. It aids in keeping the system regulated, and

stimulates their digestion. It is really a saver of corn and aids in fattening them. Chickens also enjoy it. This green material will increase the number of eggs produced by your flock. Try it.

Plan this year to add a few conveniences to the home,—things which will make life more bearable for the little wife. Can you not spend part of that money you are saving towards buying that tract of land from Brown, and install a pumping outfit, tank, and plumbing so that she can have running water in the house and all the conveniences that this means. It will save her many steps; and will be fully appreciated by all the family.

Your farm is your factory, your business. Are you running it on business principles? What kind of books do you keep? Do you know what crops you are making your money on? On what crops did you lose last year? How much? Why? Does each of your cows pay you a profit above cost of production? Is your poultry adjunct carried on at a loss or not? Can you answer these questions? If not, there is something wrong. What would you think of the president of a cotton factory or woolen mill, who did not keep any books on the cost of production or the profits from a particular line? What would you say if he told you that he did not know whether he was selling his hosiery at a loss or not, and made no effort to find out the cost of production. It is said that many farmers are boarding their cows; because, I suppose, they are such gentle amiable creatures. I bebelieve that I would rather buy my milk than board a cow which can not pay her board. It is said that many farmers in the State of Tennessee are actually paying for the privilege of raising certain crops on their own soil. Are you that farmer? What are you going to do about it?

DAIRYING IN TENNESSEE.

By R. M. MURPHY, '10.

After all that has been said about the wonderful climatic advantages that Tennessee possesses in favor of the dairy industry and the vast market that the South affords for dairy products, and the institute workers have shown beyond question that Tennessee's peculiar advantages places her in a class strictly by herself, still there is apparently not the proper response in the way of enthusiasm and progress in the industry. True, there is an increasing interest, but it would seem in the face of all of the above facts that there would be one great rush into dairying. This much can be said, the most prosperous, progressive, farmers and the best farming to be found in the State are largely confined to those farms and communities where dairying is practiced. The community surrounding Winchester in Franklin County deserves the honor of being the best farmed section of the State. Not the best land by any means, in fact it is

only a matter of about fifteen years since the great majority of that land was worn out cotton and corn land, much of it not being farmed at all. But today more largely through the instrumentality of the dairy cow than any other one thing, the farmers there are growing alfalfa in fields of 50 to 75 acres each without the least trouble and as fine as can be found in any section of the United States. The mention of the success of this one crop is enough to justify the claim that they are the best farmers to be found for where alfalfa abounds farmers must also abound.

Go into any community and look for the man who has made a success at farming. He need not necessarily be the man who has put money into the bank, or the man who has inherited the best land of the community, but rather the man who has, year by year, increased the fertility of his farm. If we investigate we will find, that in the majority of cases, this man is a live stock raiser.

The main reason that dairying is not developing more rapidly in the State is because of the fact that under present conditions it is quite frequently unprofitable. Unprofitable, not for lack of opportunity, because the facts stated in the outset are very true, but because of: 1st, a lack of knowledge of the dairy business; 2nd, keeping cows that do not pay for their feed, and 3rd, an inferior product generally offered for sale. More frequently than otherwise the man who keeps cows keeps them as a side line and gives them only the attention that his other farm operations will permit, observing no degree of regularity in their management, with no definite idea of what they are producing or the amount of feed consumed. To make dairying profitable requires closer attention than any other form of live stock farming, for it is the most intensive form and it should be made the main issue of the farm and all of the other farm operations be made to conform to its advantage.

The farm should be operated with the view of producing the maximum quantity of milk per acre rather than of any other crop.

The rotations of crops produced on the average dairy farm do not supply sufficient feedstuffs to keep one-third as many cows as if the system were planned for that especial purpose. It should be the aim of the dairyman to produce enough roughage to keep at least one cow per acre even though he has to purchase some concentrate like cotton seed meal. The trouble lies in the fact that so many go into the dairy business without changing in any way their cropping system. In a bulletin published by the University of Illinois (Circular No. 15,) it is shown that on two farms of 160 acres each, one system of cropping returned a profit of only $2.43 while the other returned $39.28 profit above interest on investment and cost of labor. One cow per acre would mean 10 loads of manure per acre every year and there are lots of acres within the State that have never received an application of 10 loads of manure per acre. But think what that would mean in increased crop production. At the West Tennessee Experiment Station an application of 20 loads of manure per acre increased the yield of corn from 15 bushels per acre to an average of 55 bushels for the next three years or a total increase of 120 bushels, which at 80c

per bushel would be worth $96.00.

In each of the above systems described the cows were regarded as being equally efficient as producers but naturally they would not produce as much under the first system as under the second because the crops grown were not especially suited to their needs, being neither sufficiently palatable nor nutritious—so that it may be concluded that there are many cows in the State which are today not yielding a profit which might do so if they were fed better. But on the other hand a great many of the cows now kept on the farm are not paying for their feed and the sad part about it is that the owner does not know it. Much the greater part of the butter made in the State today is of inferior quality and when offered for sale can really expect no market and is dumped in behind the grocery man's counter, a mixture of all shades of color and degrees of quality and flavor from whence it must go to the renovating factory before it can possibly be considered a pure food product.

Every condition is favorable for immediate progress in dairying with one exception. The farmer himself is not educated to the point where as a business man he will grasp the opportunity that offers him the most satisfactory returns.

VALUE OF FARMYARD MANURE IN CROP PRODUCTION.

By F. W. Fleming, '14.

Farmyard manure has three main functions in increasing the crop production of the farm: (1) To improve the physical condition of the soil by the introduction of organic matter in the soil. (2) To add plant food in a comparatively readily available condition. (3) By introducing bacteria in the soil that are capable of furthering decomposition and rendering plant food more available.

In regard to the first of these, farmyard manure is an excellent source for humus, the addition and maintenance of which is necessary to plant growth. It aids plant growth by improving the physical condition of the soil and thus increasing its water holding capacity. A sufficient amount of humus also gives a dark color to the soil which permits the absorption of heat more readily as a consequence of which the temperature of the soil is raised.

As to the actual amount of humus added to the soil by the addition of manure, it is estimated that 40 per cent of the organic matter that is fed to animals is returned in the manure, and all of the bedding used is so recovered. Heiden found by actual experiments that 47 per cent of the dry matter fed to a horse was recovered, and a full grown steer returned 56 per cent of the dry matter of the feed. Other experiments have shown that from 40 to 50 per cent of the organic matter of the feed eaten was recovered in the manure, but with the usual methods of handling probably not over one-fourth to one-third reaches the field. So it can be readily seen that manure is an excellent source of humus and therefore should be pre-

served so far as it is possible to do so.

With reference to the second beneficial effect of barnyard manure it is valuable in proportion to the amount of nitrogen, phosphorous, and potassium it contains. And, it is these elements almost entirely that have to be added to the soil to increase plant production. Yet experiments have shown that they are not a balanced ration for plants as they are found in manure. The Ohio Experiment Station carried on an experiment with fertilizers and manures in a crop rotation and found that manures used with continuous cropping will not maintain the maximum yield, but when used in connection with crop rotation it increases all the crops in that rotation. It further found that manure used in conjunction with phosphatic material will give better returns than when either is used alone. This is due to the fact that manure is much richer in nitrogen than it is in the other elements and it is best to reinforce it with phosphorous or potassium.

It might be well now to make a comparative estimation of the value of manure. And as nitrogen is the most important of the fertilizing elements we will take it as a basis. The Woburn Experiment Station has been carrying on a long experiment with wheat and barley, grown continuously. The average application of manure has been a little less than 8 tons per acre with an estimated content of about 164 pounds of nitrogen. Of the chemical fertilizer, 260 pounds of nitrate of soda and 100 pounds each of sulphate of soda and magnesia were used with 392 pounds of superphosphate. In all cases there has been reduction of yield, showing that the quantity of neither of these is sufficient to maintain the yield of these crops when grown continuously, but the reduction on the fertilized land has been much greater than on that receiving manure.

Now let us view this from another standpoint and be a little more specific in comparison. It was found from a result of an experiment at the Ohio Experiment Station that steers averaged at the rate of nine tons of manure per year. An equal weight of sheep produces fewer tons, but the manure is drier, so that about the same amount of plant food is produced. A fairly safe rule for any stock, except poultry and hogs, is to count one ton per month for each 1000 pounds of animals kept. To purchase an equal amount of plant food in fertilizers would cost about $30 per year. It found that a ton of manure was worth $2.06. This was calculated by taking the averages of several analyses of yard manures, 9.5 pounds of nitrogen, 2 pounds of phosphorous, and 7 pounds of potassium, and valued them at 15c, 11c and 6c, respectfully.

Other factors, worth mentioning, affecting the value of manure with reference to its composition are, the kinds of food consumed by the animals making the manure, and the method of preservation. The richer and easier the food is digested by the animal the richer will be the manure. As to the preservation of manure, the Ohio Experiment Station found that the liquid excrements of farm animals contains nearly half the nitrogen and potash voided, and it estimated that the manure from a steer, fed on a solid floor, is worth $4 more per year than that from an earth floor.

The third beneficial effect of farmyard manure in crop production is the increase of the number of favorable bacteria in the soil. It introduces into the soil, and furnishes a favorable medium for the growth of large numbers of bacteria that are of great value in rendering available the plant nutrients contained in the soil. These bacteria, through processes not known, decompose some of the mineral matter of the soil and thus contribute to soil productiveness. This is somewhat shown by using difficultly soluble phosphate fertilizers in conjunction with manure and noticing the greater efficiency of its availability. These bacteria are capable of producing compounds that are attacked by other bacteria, and so from one stage of decomposition to another they render the organic matter as well as the mineral matter of the soil more soluble and more readily available to the plant.

THE HOME GARDEN.

By W. S. Baldwin, '15.

Observations on the home garden of Tennessee and other states indicate that its real value has not been properly considered and appreciated. The value of a home garden is probably best realized by those who have all their vegetables to buy. Even in its highest state of perfection it may not bring in one cent, but it is difficult to estimate the dollars it keeps in the family purse. Its importance should therefore be estimated from the amount saved and not from the amount made. And aside from the economy, the owner of a well-kept garden derives pleasure and commendable pride and has the satisfaction of knowing that he is providing himself and his family with fresh and wholesome vegetables.

It is comparatively an easy matter to grow a good garden if the owner takes the trouble to post himself and gives it the necessary attention at the proper time. It is the tendency of many farmers to neglect the garden for general farm work, but on account of its extreme importance it can not afford to be neglected.

In planning a garden one should have in mind the production of a liberal, uniform and constant supply of vegetables preferred by members of the family. Most every garden contains plenty of vegetables in the middle of the growing season but falls short in a supply of vegetables in early spring and late fall. One reason of this is the ignorance of the requirements and hardiness of common garden plants. That a number of our most common vegetables will withstand repeated freezing is not generally understood and the consequence is that no effort is made to grow them. Experiments at the Arkansas station showed that the following vegetables survived a temperature of 14°F: Beets, cabbage, carrots, celery, cress, collard, kale, lettuce, mustard, onions,

salsify, spinach, parsnips and turnips. The temperature is seldom below this in Tennessee before December 1st and we should have a bountiful supply of vegetables at least until that time. By making fall sowings of turnips, spinach and kale it is an easy matter to have plenty of fresh greens all the winter. Potato onions planted in the fall insures good onions for early spring use. Raddish and lettuce may be very successfully grown in hot beds, and in this way will mature early. In order to keep a continual supply of fresh vegetables ready for use several plantings of each vegetable must be made. Early planting of peas, beans, and cucumbers should be followed by later plantings to be ready for use when the first gives out. A late setting of cabbage will be necessary to provide for fall and winter use. Late tomatoes and sweet corn for canning purposes should not be neglected.

It is important to grow as many varieties as possible as this will greatly enhance the value of the garden, and by growing many varieties members of the family may come to like some vegetable which they had before considered of very little value.

Good quality in vegetables is to be desired. This will depend upon the variety, the kind of soil, care, and climate. A quick growth of garden plants helps in production of good quality.

The location of the garden must be carefully considered. It is much better to locate the garden near the house as most of the work in it is done at spare times. If it is some distance away too much valuable time will be lost in going to and from the garden each day for fresh vegetables.

A light sandy loam is best suited for gardening, but fine vegetables are grown, with ordinary care, on most types of soil. The lay of the land has considerable influence upon the amount of heat absorbed by the soil from the sun, and the time the soil can be worked, so a gentle slope toward the south or southeast is better for early crops. It is an advantage to have protection from the wind. Natural protection, as a grove or forest is best; but a hedge, a stone wall or a tight board fence will be very beneficial.

It would be difficult to give a plan for a garden to suit all demands, but suggestive arrangements are here presented with the idea that they can readily be changed to suit local conditions.

The first consideration in planning the arrangement of the garden is the kind of cultivation to be employed. Where the work is to be done by horses the arrangement should be such as to give the longest possible rows at distance of at least 2½ ft. apart. For hand cultivation the arrangement may be quite different as garden may be laid off in sections and rows can be made much closer for most crops. Horse cultivation is recommended wherever possible as it very materially lessens the labor and cost of caring for the crop.

The second consideration is the location of permanent crops such as asparagus, rhubarb and any of the small fruits as currants, goose berries or raspberries. These are usually placed at one side of the garden so as to be out of the way of cultivation.

Due consideration should also be given to the matter of succession of various crops in order that the land

Hot Bed	Cold Frame	Asparagus	Rhubarb and Herbs
Walk			

Lettuce, Radish, Onions Carrots, Parsnips and all crops that may be grown in 18-inch rows	Peas (followed by Celery)	Peas (followed by Celery)	Beans (followed by Spinach)	Beans (followed by Spinach)	Cabbage (followed by Late Peas)	Cabbage (followed by Late Peas)	Tomatoes	Tomatoes	Tomatoes	Cucumbers	Cucumbers	Cucumbers	Musk Melons	Musk Melons	Potatoes (followed by Late Cabbage)	Potatoes (followed by Late Cabbage)	Potatoes (followed by Late Cabbage)	Corn (followed by Turnips)	Corn (followed by Turnips)	Corn (followed by Turnips)

Plan of City lot or back yard garden 50x90 ft.

Hot Bed	Cold Frame	Seed Bed	1 Rhubarb Currants, Gooseberries or Raspberries
Entrance			2 Asparagus

3	Parsnips Carrots
4	Oyster Plant
5	Beets Peppers Egg Plant
6	Lettuce (followed by Celery) Raddish (followed by Celery) Onion sets followed by Celery)
7	Early Beans (followed by Celery)
8	Early Peas (followed by Celery)
9	Peas or Beans (later plantings) followed by Potato Onions
10	Peas or Beans (later plantings) followed by Potato Onions
11	Peas or Beans (later plantings) followed by Potato Onions
12	Peas or Beans (later plantings) followed by Spinach
13	Early Cabbage (followed by late Beans or Peas)
14	Early Cabbage (followed by late Beans or Peas)
15	Tomatoes (4 ft. apart in row)
16	Tomatoes (4 ft. apart in rows)
17	Late Tomatoes (4 ft. apart in row)
18	Okra, Spinach and Miscellaneous Vegetables.
19	Cucumbers Melons Squash
20	Early Potatoes (followed by late Corn planted between the rows)
21	Early Potatoes (followed by late Corn planted between the rows)
22	Early Potatoes (followed by late Cabbage planted between the rows)
23	Early Potatoes (followed by late Cabbage planted between the rows)
24	Early Corn (followed by Turnips)
25	Early Corn (followed by Turnips)
26	Early Corn (followed by Turnips)
27	Sweet Potatoes (followed by Pumpkins)
28	Sweet Potatoes (followed by Pumpkins)
29	Lima and Other Pole Beans

Plan of a 1-2 acre Garden 220x100 feet,

may be occupied all the time. As soon as the first plantings become unproductive they should be followed by other crops. By proper arrangement as many as three crops may be grown on the same land, in one season.

Where hand cultivation is employed the rows are usually placed so closely together that companion cropping must be practised. For instance, if the rows are 1½ ft. apart, this would be too close for cabbage, so cabbage rows should alternate with raddish, spinach or some similar plant.

The preparation of the ground for the garden should begin in the autumn or early spring. If the soil is a stiff clay then fall plowing would give time for the freezing and thawing to break up the clods into fine particles. Sand loams may be plowed early in the spring to give time for the soil to settle before planting. Unless soil is very shallow deep plowing is much better. An occasional harrowing of the ground, after plowing until planting time, will kill the weeds and preserve the moisture.

For garden crops there is no better fertilizer than well-rotted barnyard manure. It is better to apply it during the winter and turn under in the spring or if well-rotted manure is used a top dressing may be made after plowing and then thoroughly mixed with the soil by means of a tooth harrow. Commercial fertilizers are not as satisfactory as barnyard manure, but where barnyard manure can not be obtained a high grade fertilizer at rate of 1000 lbs. per acre may be used and results noted. Top dressings of Nitrate of Soda while plants are small will hasten their growth and make larger and better quality vegetables.

It is desirable to start plants of certain crops before danger of frost is over. Enough plants for a small garden may be started in a good sized box of earth in a south window but for larger gardens the hotbed is almost indispensable.

The time of planting varies for different vegetables. The blooming of the peach is assigned as a time for seeds that will germinate in a cold soil and resist a slight frost. Among these are peas, spinach and onions. When the oak leaf breaks from its bud is the time for planting beets, corn and tomatoes. Seeds that thrive only in warm soils as beans, cucumber, cantaloupe, watermelon, okra and squash may be planted when the blackberry is in bloom.

Having properly manured and prepared the soil and planted the crop, cultivation will next demand attention. Cultivation at the right time and in the right way is very important. The lack of proper attention to cultivation will result in a deficiency in both quality and quantity. The principal objects of cultivation are to rid the ground of weeds, which rob the plant of its nutriment, and also to keep the soil loose. As a general rule cultivation should be shallow. After each rain the surface of the soil will need a thorough loosening as this kills the weeds, prevents baking, admits air, and retains moisture.

It is not enough, however, to cultivate only after rain but, if dry weather prevails shallow cultivation must be continued.

The above is a brief summary of some of the more important phases of home gardening. For more complete information write to Dept. of Agriculture, Washington, D. C., for Farmer's Bulletins Nos. 94 and 255.

THE VALUE OF CORN IN THE DIET.

By MISS LENA MILLS, Special

Corn is one of the most valuable of food materials. It may be cooked in a number of ways and is the cheapest source of energy. Corn breads are especially valuable where the time for preparation is limited or the facilities for cooking are few or simple.

The economy of corn meal is shown by the following comparison in Farmer's Bulletin Number 298.

Corn is usually considered a winter food because it is rich in fats and carbohydrates and is a fattening food but it may be used extensively in the summer diet as well as the winter.

Experiments show that corn meal is easily assimilated and this property increases its value very much.

"The meal, when used for bread, cakes, porridge, puddings, etc., and hominy and other corn foods are cheap and apparently well digested sources of both protein and energy."

Most cook books give a variety of ways of preparing corn products, the following recipes are a few examples:

Lye Hominy.

1 peck of corn, 1 quart of hardwood ashes.

Tie the sifted ashes in a bag and put this with the corn into a vessel with enough water to cover. Cook slowly until the skin separates from the kernels. Wash the corn in cold water until all trace of the lye is gone. It is now ready for use. It may be heated and served or browned in hot bacon fat or butter.

Corn Meal Mush.

3 cups of water, 1 teaspoon salt, 1 cup meal.

Stir the meal very slowly into the boiling salted water, let boil directly over fire ten minutes then set the vessel in water and let it cook about two hours.

Hominy or grits may be cooked in the same way but require longer cooking.

In batter breads first scald the meal.

Corn Meal Muffins.

1½ cups meal, 1½ cups buttermilk, ½ cup flour, ½ to 1 teaspoon soda, 1 teaspoon salt, 2 tablespoons lard, 1 egg.

Sift the flour and meal together, beat the egg, add the salt and milk

Kind of Material	Price per Pound	Cost one pound protein	Cost 1000 Calories energy	Amount for 10 cents: Total for material	Protein	Fat	Carbohydrates	Energy
	Cents	Dollars	Dollars	Lbs.	Lbs.	Lbs.	Lbs.	Color
Corn Meal, granulated	2.5	.32	.02	.4	.31	.07	2.96	6,540
Wheat flour	3.	.31	.02	3.33	.32	.03	2.45	5,440
Corn breakfast food, flaked and parched	13.	1.73	.08	.77	.06	.01	.60	1,335
Oat meal	4.	.29	.02	2.50	.34	.16	1.66	4,500
Potatoes 60 cents per bushel	1.0	.67	.03	10.	.15	.01	1.40	2,950
Beef, sirloin	20.	1.28	.20	.50	.08	.08	...	515
Milk, 7 cents per quart	3.5	1.09	.11	2.85	.09	.11	.14	885

and stir into the dry ingredients. Pour in the melted lard and add enough soda mixed with two tablespoons of water to make the batter bubble. Pour into a hissing hot greased pan and bake in a hot oven.

Cornmeal Batter Cakes.

Use the above rule, adding ¼ cup more milk.

Boston Brown Bread.

1 cup flour, 1 cup cornmeal, 1 cup buttermilk, ½ teaspoon salt, 1½ teaspoons soda, ½ cup molasses, ¼ cup raisins.

Mix and sift the dry ingredients. Add the liquid and stir in the washed and seeded raisins. Turn into a well buttered mould, or baking powder can and steam three hours. The moulds should be only two-thirds full and the covers should be tied on. Cut with a string.

Spoon Bread.

2 cups cold cooked hominy, 2 tablespoons butter, 2 well beaten eggs, ½ cup corn meal scalded in 2 cups milk.

Stir the eggs into the hominy and add the salt. When the scalded milk and meal cool, stir them into the hominy. Add the butter. Bake slowly for one hour in a greased pudding dish. Bacon fat may be used for butter in this recipe.

Corn Pone.

1 pint meal, 1 teaspoon salt, ½ to ¾ cups buttermilk, 1 tablespoon shortening, ¼ to ½ teaspoon soda.

Sift meal, soda, and salt together, add shortening and enough milk to make a soft dough. Form into pones and bake.

Cracklings are often used for shortening in this bread.

PRODUCING AND KEEPING SWEET POTATOES.

By F. G. VICKERS, '16.

Sweet potatoes is a crop that can be grown on most any soil that will produce cotton or corn. However, the best yields and best quality are gotten on light soils containing much humus. Farmers find it an easy matter to grow enough of this crop for their home use, but they find it difficult to keep their crop until it can be consumed.

If the farmer intends to grow potatoes only for his own use, a portion of his garden or some other small area near his house will produce the desired amount. Twenty to forty square rods of ground is enough. If he aims to produce potatoes for the market, he will do well to select a light, fertile soil. This type of soil he may not have near his house. If he has this type of soil anywhere on his farm and a sufficient area it would be profitable for him to plant them there, even though it be some distance from his house. The difference in yield will over pay for the labor required to carry them to the storage room. In addition to the increased yield, the quality will be better.

The preparation of the soil for setting the "slips" varies with different growers. The most general method is to ridge the ground. This gives a large amount of loose soil for the roots to develop in, but is not so easily worked as is a level surface. If the ground is not infested with weed or grass seeds, the cultivation will not require as much labor as do most other crops. The vines generally cover the ground after the second or third cultivation.

The yield depends upon the kind of soil, the amount of fertilizer used, and the variety grown. Soil that will produce fairly good yields of corn

will generally produce as much as 200 bushels of sweet potatoes per acre. This means about $200 gross receipts per acre if the crop is kept until the latter part of the winter or early spring before disposing of it. Experiments have shown that it requires about 30 pounds of nitrogen, 10 pounds of phosphoric acid, and 45 pounds of potash to produce 200 bushels. If this amount of fertilizer or a proportion thereof is applied to the soil the yield can be considerably increased.

If early potatoes are desired the "slips" will have to be grown in hot-beds. This enables the grower to have "slips" ready to set in the field very early in the spring. It is wise to delay setting until all danger of frost is over, for the slips are very tender and a slight frost will kill them. A hot-bed may be made by digging out a place in the ground about two feet deep and of the desired dimensions. Boards are placed on top of the ground so as to form a frame around the bed with the northern side 8 or 10 inches higher than the southern side. Dirt is then banked around the outside of the board frame. Fresh horse manure is put in the bottom of the bed to a depth of 12 or 15 inches. This is allowed to remain until it begins to heat, then fine rich soil is added to a depth of about 4 inches. Next the potatoes are placed side by side on the soil and covered with a layer of soil about two inches deep. The bed may be covered with glass sash to keep in the heat and keep out the cold; or canvas may be used instead, depending on the temperature. The temperature of the hotbed should be about 80 to 85 degrees (F) when the potatoes are bedded, but gradually dropped to about 60 degrees during the next six weeks. By this time the "slips" should be set in the field, if weather conditions permit. The "slips" should remain in the bed until well rooted.

Farmers in Tennessee, or other Southern States, who do not care to go to the trouble of fixing a hot-bed can make a very efficient bed as follows:

1. Remove the soil to the depth of six inches.

2. Fill the place with fresh manure, pack and wet thoroughly.

3. Cover the manure with loose rich dirt about two or three inches deep.

4. Place the potatoes side by side on the dirt. A little wheat or rye straw placed in a very thin layer over the potatoes will help hold them in place while the "slips" are being removed.

5. Cover the potatoes about two inches deep with fine sand, leaf mould, or well rotted manure. A bed prepared in this way should produce "slips" in three weeks.

The first requirement for keeping sweet potatoes is that they be well matured. A potato dug before it has properly ripened will soon decay. In order to have them matured, they must be planted early so they will get their growth before frost.

The second requirement is that they be kept at the proper temperature. Immediately after digging they should be put into a room heated to a high temperature (85 to 90 degrees) and left for a few days, or if this is not practicable, they should be allowed to remain in the sunshine at least long enough to dry off the outside so all the dirt will fall off. Then

they may be stored away where they will be kept from freezing.

Various methods of storage are practiced by the many growers of the South. Some have cellars, some pits, and a few have houses built for the purpose. One successful truck farmer of East Tennessee digs his potatoes in the morning and lets them lay in the field so as to get the afternoon sun. This dries off the outside. After sunning them two or three hours, he sorts them and stores them away in his cellar. His potatoes keep well in this way. While this particular farmer gets good results from his cellar, many others do not.

The best and surest method of storing in large quantities is to have a house built for the purpose. Such a house need not be expensive. It should consist of two tight walls about eight or twelve inches apart, filled in between with sawdust. Six hundred to eight hundred bushels may be stored in a house twelve feet wide by twenty feet long and eight feet high, inside measure. The foundation of the house should be of brick or concrete. The floor should be a few inches below the surface of the ground. There should be an opening through the top of the house to allow bad air to pass out. A pipe four or six inches in diameter would serve to let fresh air in at the bottom. Both ventilators should be provided with a cover so as to cut off the flow of air during cold weather.

Detachable shelves made of strips of four-inch lumber should be placed in rows inside the house. Each shelf should be separate from the others with a partition between. They should be about three by five feet and placed one about two feet above the other. On each shelf could be placed about ten bushels of potatoes. The cracks between the strips would permit air to pass freely all through the shelves.

A small stove should be placed in the middle of the floor of the house to be used in drying out the potatoes just after they are dug. It is better to have the stove below the surface of the floor. As soon as storage begins the temperature of the house should be kept at about 85 or 90 degrees for about ten days, then gradually lowered to 55 or 60 degrees. A house of this kind has been in use for a number of years by a farmer near Knoxville, Tennessee. It keeps potatoes in splendid condition from the time they are stored until the next crop is harvested.

RAISE HOGS FOR PROFIT.

By L. C. PACE, '16.

This is a subject worthy of attention, owing to the exceedingly high prices for the past few years. With hogs selling around the nine-cent mark, this animal becomes of more than ordinary importance. Yet a good many farmers have gotten the idea that with the extremely high values for grains which have prevailed in recent years there is not much money in pork production, even at the high range of values

which have prevailed for hogs.

There is hardly any question but that pork will remain high throughout the coming year, and probably for several years to come. As long as the demand for pork is greater than the supply, the prices will still remain high. On account of the disease of cholera and also on account of the drought, the supply has been lessened and the demand has grown so that it is greater than the supply. There is also another reason why pork is high, and why it will remain so until the conditions are changed, and that is this: There are many farmers who do not raise hogs enough to furnish meat for their own use.

It has been the opinion heretofore that one couldn't raise hogs with profit unless he had enough corn with which to feed them from the time they got large enough to eat until they were ready for market. This is not the way of today. It has been learned that hog growing is not dependent on corn raising alone; we have the small grain fields and the forage crops with which to supplement the corn.

Grain will remain high as long as hogs are high and in order to get the most out of hogs raised on the farm, preparations should be made for plenty of forage crops to help in growing them. Clover and alfalfa, without doubt, are the best forage crops for hogs, but one is not able always to grow these forage crops where it is convenient for hog pasturage. Nearly every farmer has some small lots about the barn for a convenient run for the hogs and other live stock. Oftentimes some of these lots stand idle all the summer, when they could be made to produce some forage crop that would furnish the maximum feed for pigs. Two crops that are particularly adapted to this purpose are rape and peas. A few acres sown to these crops early in the spring will provide an abundance of profitable forage for the hogs during the summer season when pasturage is generally poor.

In order to raise pork for a profit there are several things to take into consideration. First, we must have a good stock of hogs as we know that good breeding and feeding go along together, not only in hog raising, but in any kind of live stock business. There are several good breeds of hogs, and the farmer must be his own judge as to which one he shall raise. Another thing to take into consideration is the health of the herd. Their health must be protected and cared for if one wishes to make the most profit from them. There is, perhaps, no other animal on the farm which succumbs more readily to disease than the hog. The good health of the animal is one of the necessary requirements for profit. An unhealthy hog is unprofitable, even though the disease or trouble from which it is suffering is not contagious. Every care should therefore be taken to preserve health.

There is another consideration which most farmers think is a minor one, but it is one of the most important; that is the question of the brood sow. Some people do not pick

their sows for breeding purposes; they just take and keep the one which happens to get with pigs first or one they couldn't sell. The sow must be prolific as well as of good appearance if she brings to her owner the profit she should. She should raise at least eight pigs to the litter to be very profitable. Of course, the most profitable sows are not always the leaders in the show ring, but, when the farmer is raising hogs for meat he is not caring about the show ring.

The next question that may arise in growing pork is, "When is the best time for the pigs to be farrowed, in the spring or in the fall?" If one has plenty of winter feed and can care for the pigs and sows during the winter, it might be better to raise fall pigs, but under most of the Tennessee farmers' conditions it is best to raise spring pigs. In this way they can be raised with the least amount of corn and other grains. When a sow farrows about the last of March or the first of April she can be turned into a pasture of some kind, such as clover or alfalfa, and with very little additional feed, such as slop and a little corn, she can raise the pigs without much cost. Then, when the pigs get large enough to eat they can be fed some kind of slop and kept growing all the while. The farmer can arrange forage crops for the hogs all the summer if he manages it right. Then, by the time corn is beginning to mature they will be large enough to turn in the field and hog down the corn. "Hogging down" is becoming one of the leading ways of gathering and feeding corn. Several experiments have been carried on in this line for a number of years and they have shown that this is the best and most profitable way of feeding corn to hogs. Now, by the time the farmer is ready to sell his hogs or kill them for pork they will be about the proper size for marketing. By this method spring pigs, if they are kept in a good growing condition all summer, should weigh from 200 to 250 pounds by the time they eat up the corn or by November or December.

The next question that would come is about the marketing. If the farmer can't get the best prices at his own town market and he has not enough to ship, the thing for him to do is to co-operate with some more farmers and ship in car load lots to the highest markets.

NEWS.

It will no doubt be of interest to the readers of this paper that out of 12 basket ball games the "varsity" has played they have won 10. Some basket ball team!

—o—

Dr. M. Jacob has just returned from the West Tennessee Experiment Station where he applied the tuberculine test to the Holstein herd.

—o—

Professor C. A. Wilson addressed the 15th Annual Convention of the Association of Southern Agricultural Workers, held at Montgomery, Ala. He discussed "Some Beef Feeding for Tennessee."

THE U. T. FARMER

Scientific; therefore practical

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EDITORIAL.

Man has reached the high stage of intellectual development which he now has through the accumulated knowledge gained by the study and experience of many generations. If one generation solves an important problem, the matter is recorded in printed form so that all generations following may benefit by it. Civilization could not possibly advance if this were not so. If every man had to "work out his own salvation" along educational lines, the last generation would be no better off than the first; the same blunders would be made time and time again.

Our present knowledge along almost all lines is the result of the life time work of many men. We study their steps, prosper by their successes and are cautioned by their failures. What doctor would think of learning his profession without thoroughly acquainting himself with the works of the great doctors of the past? What lawyer, before undertaking to defend a case would not study the arguments and decisions given in previous cases of a similar nature? What political economist, in endeavoring to solve a particular problem, would not search the records of all nations to see how similar problems have been solved before? Thus we benefit by the experiences of our forefathers.

Along those lines in which a great deal of study and work has been done and accurate records kept, the advancement has been most marked. Especially notable are the sciences. If a scientist wishes to work upon a problem he first studies very closely all that has ever been done along the line. He thus begins his work high upon the ladder, and may climb to a height which would have been utterly impossible had he been obliged to start from the bottom.

Is there not something to be gained in considering these things and then turning our attention for a moment to the condition of the farmer. Should we not expect agriculture, which is the oldest of the sciences, arts, and professions, to be the most highly developed, rather than the pure

sciences, medicines, law and others? What, then, has kept agriculture from its lawful heritage? I believe that we may safely conclude that a very far reaching influence has been the lack of accumulative experience. Each generation has been beginning at the bottom of the ladder and falling from the rounds that have been broken by others; instead of, as is done along other lines, stepping over the places which our forefathers have shown to be weak.

From generation to generation the farmer is making the same blunders merely because he does not know the steps of his forerunners; because he does not search for these steps as does the scientist, doctor, or lawyer.

To some extent the records of agricultural work is incomplete; yet there is sufficient material, easily available, to place every farmer who will but study his problems on firm footing. This leads us up to the importance of the farm library but space will not allow us to enter this field here. We will take up this phase in the next issue. Suffice it here to say that the Farm Library, if of the proper material and if properly and frequently used will undoubtedly go far in placing agriculture as far up the ladder of development as are the other sciences.

CHAMPION HOLSTEIN OF THE SOUTH is Lady Woodcrest Colantha Lad, 136686, of the West Tennessee Experiment Station. Her official record, completed a week or two ago, for her first period of lactation was 13294 pounds of milk and 631 pounds of butter. Her milk sold for $3 per one hundred pounds and she produced a calf worth not less than $200. The feed for her, cost $110.09.

Years ago when America was a new land, farmers of this country had quite a few problems to solve. Today conditions are different; a great host of insects and fungous diseases which were unknown in America in earlier days, are laying waste to field crop and orchard. The Hessian Fly, the San Jose Scale, the Brown tail Moth and numbers of others of our worst enemies have been brought to us from other countries. The introduction of all these pests, and the transfer of insects and fungi from place to place by our railroad traffic has led us into an age when the farmer, if he wishes to get good results from field crops, garden crops, or orchards, must pay the strictest attention to farm insects and plant diseases.

Every farmer should acquaint himself with the characteristics of the various plant enemies, so that he can readily recognize them. He should also know the remedies. A few of the far-reaching rules for the control of insects and fungous diseases should be kept in mind and always observed. A few for insects are: Fall plowing, clean cultivation, crop rotation, destruction of all rubbish, cleaning out of fence corners and for immediate relief use of poisons. The fungous diseases should be held in check in much the same way. The rotation of crops with certain diseases is of the utmost importance. It is also very essential that all diseased plants or parts of plants be destroyed. In pear blight. which is a bacterial disease, this precaution should also be taken.

Those diseases or insects which have not yet reached a particular lo-

cality should be especially well guarded against, as it is much easier to keep trouble out than to get it out. The San Jose Scale is not in all sections of our State as yet. Such places as are free from it will do well to keep a close lookout for the pest and the very moment any are found in the orchard a thorough spraying should be given to insure the destruction of those scales present. Similar precaution should be taken with other insects and diseases.

The whole community, the whole county, and the whole state must work together in insect and disease control. The U. S. Government is spending enormous amounts of money trying to protect the farmer from some of his worst enemies; the farmer should certainly be willing to do all in his power to assist in this work.

NEWS.

Some time ago Professor Morgan spent the week end at the West Tennessee Experiment Station. He says that "considerable improvements were going on there outside the regular work." Furthermore, the feeding experiment of the three hundred head of cattle and stockers was very active at that time.

By this time, however, the feeders have finished and are ready for the St. Louis market.

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A week or two ago, Professor Pridmore visited Huntsville, Scott County, where he addressed the Farmer's League on "Soil Improvement."

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The Ag Club entertained the Short Course students a week or two ago at the University Farm. The entertainment was given in Temple Hall with a big attendance. After several talks, the first being by Professor Morgan, followed by two or three short course students, refreshments were served. After the dainties were done away with every one enjoyed a pleasant smoke and went home with the satisfaction of having spent a happy evening.

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Professor Harry Clark addressed the Agricultural Club at one of its meetings last month, on the "Problems of Rural Life," in which he made it clear that agricultural students should be studying these problems, now, in order that they may be able to meet them with more success when they go out from the University.

As a result of this and other reasons the Club is about to take up the subject and formulate its program with a view of acquainting the students more thoroughly with the economical side of farming.

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The Short Course is doing great work, now. Since about the 15th of last month they have been studying dairying and horticulture. Much interest is being manifested by the students, as a result of which much practical information is being obtained.

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Mr. Murphy of the 1910 class has been assisting in the short course work.

THE
U. T. FARMER

ONE OF THE NEEDS OF TENNESSEE.

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PICKING CREW ON ONE OF TENNESSEE'S LARGE STRAWBERRY FARMS.

THE U. T. FARMER

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THE STRAWBERRY ROOT LOUSE IN TENNESSEE.

By J. U. GILMORE, '15.

Within the last two years an important strawberry pest has appeared in Tennessee. It is no other than the Strawberry Root-louse, its scientific name being, *Aphis forbesi*, Weed. The Annual Report of the State Entomologist for 1912 notes its first appearance as being in Henry County, and gives other places in Tennessee where the insect is found. In same Report the life history and methods of control are given; together with pictures and figures showing the importance of strawberry growing in the State.

In order to avoid any mistake some specimens were sent to Washington, D. C., for determination. Dr. L. O. Howard, Chief of the Bureau of Entomology determined them as *Aphis forbesi.*

There were 15 growers in 1912 who had infestations of from 5% to 75% and these men were not given the usual certificate of inspection. The Annual Report for 1913 is not published yet, but we would be safe in saying that there were some certificates withheld this last year altho' the number is not known to the writer.

If bare spots are found in a strawberry field and the plants close by appear wilted or sickly, you should pull up a few of those plants and examine closely the entire plant for a greenish-black, pear-shaped, plant louse. In June or July there should be enough of them to be easily seen, as the over wintering eggs hatch in March or April and the lice from the eggs give birth to living young which mature sufficiently in 15 days to give birth to more offspring. 20 to 30 lice have been known to be the progeny of a single mother louse.

It is thought that the root-louse in Tennessee, passes the winter in the winged adult state upon the roots of the strawberry. We know that eggs are laid in the fall and these pass thru' the winter and hatch with the approach of warm weather in spring.

The young lice feed for a while upon the older leaves and then work toward the tender succulent leaves near the crown, where they can easily insert their sucking-tube into the juicy plant cells.

The first and second generations are mostly, if not all, wingless and all give birth to living young. About the time of the third or fourth generation some winged aphids appear which may or may not produce living young. As a rule we believe the winged aphids of these generations do produce living young.

Many generations are produced in the entire summer in Tennessee; more and more winged ones appearing upon the approach of cold weather, when we find the true sexes present. It is now that the small, black, shining eggs are laid upon the hairs of the petiole

or leaf-stalk. This occurs about the month of October.

A small brown ant (*Lasius alienus*) plays an important part in the welfare of these root-lice. The ants care for the eggs during the winter. When the lice appear they are kept upon fresh plants so that they will be well-fed. The ant of course gets something for its trouble, i. e., it takes honey-dew from the louse, which is given off thru' two little tubes on the rear of the louse's body. The lice would probably be unable to get upon the roots of the strawberry plant if it were not for the ants.

The most important question of all however is the control of this destructive root-louse. First we must prevent its introduction to our strawberry fields. This can best be done by setting only strictly uninfested plants and then by not setting them in a field already infested by this insect pest. Grow some other crop in the infested land for at least two years.

If you are afraid your plants have eggs or lice upon them they may be disinfected easily and economically. The eggs must all be hatched however, as there is no treatment strong enough to kill the eggs that will not seriously injure the plant. The most practicable method of disinfecting is to dip the plants in tobacco extract or some other tobacco compound. Other dips will kill the root-lice but will also injure the plant.

The large grower may use a special fumigating house and fumigate with hydrocyanic acid gas, using 1 ounce of Potassium cyanide, 2 ounces of Sulphuric acid and 4 ounces of water. The plants may be exposed to this gas for 10 to 15 minutes, and the root-lice, if present, will succumb.

In the control of this pest we must look toward two little bees or Hymenoptera, (Lysiphlebus testaceipes Cress., and Lygocerus stigmatus Say.) These parasites deposit their eggs in the Root-lice, usually one egg in each louse. The egg hatches and the maggot lives on the fat tissue of the louse, finally eating all of the internal organs away. The louse about this time becomes inflated and swollen to twice its normal size. In a few days the parasite emerges thru' a circular opening in the back or side of the louse. These enlarged brownish looking lice should never be molested as they are already dead as can be and they each contain a friend for you which will help you to control the Strawberry Root louse.

Rotation is suggested as a means of control, also burning off the strawberry field before the plants send up new spring leaves. The burning would probably rid the beds of all other insects and diseases, and if carefully done, can result in no injury.

GROWING SPRING LAMBS FOR THE MARKET.

By GEO. P. TURLEY, '17.

In dealing with this question we have several things to take into consideration before the lambs are dropped. First, it is absolutely necessary to have a good ram. This ram should, for our purpose, be a good

type of a mutton breed. Without such a ram it is impossible to put first class lambs on the market. Next we must have a good flock of ewes. They should be in good breeding condition and, as it is out of the question for the average farmer to own a pure bred flock, they should be good grades of some medium-wool type to cross with the mutton type of ram.

Now comes the question of when to have the lambs dropped. This is determined by the average climate of the particular locality and by the amount of available winter pasture. If a farmer has planned to have plenty of winter pasture he can have his lambs dropped early and have sufficient grazing by the time the lambs begin to arrive. It is extremely important that the ewes give plenty of milk for their lambs. If a lamb once gets stunted it is impossible to make it weigh what it should by selling time. All ewes that are deficient in quantity of milk should be sold as soon as the deficiency is discovered.

If the farmer has a good field of, say, barley and crimson clover, or any other good cover crop to turn his flock on when the first lambs arrive and has another field or grass lot handy on which to put the flock for a few days to give the first field a chance to grow a little, he is pretty certain to have a good bunch of lambs to put on the market.

It is essential to best results that there be some kind of shelter for the sheep in rough weather where they may be fed. Dry cold does not hurt sheep, it is from the cold rainy and sleety weather that they need to be protected. It is then that so many new lambs are lost.

It is advisable to have a separate lot in which to put the ewes and young lambs as the lambs are dropped. It is best to put these young lambs up every night for a while unless the weather is very mild. The ewes should have in addition to abundant forage, a little grain daily.

If best results are to be obtained it is all important that there be unlimited pasturage from the time the lambs are old enough to graze until they are sold. If they are once allowed to get even slightly thin it is very difficult to make them regain their flesh and reach their maximum development by the time the others are ready to go on the market. After the lambs are about half grown it is a good idea, even when grazing is good, to give the flock a little additional feed. Where turnips are available the chopped roots, over which a small amount of cotton seed meal has been sprinkled, make a satisfactory ration. Cotton seed meal and hulls is also a good ration for the flock.

The farmer who goes into the sheep business with a few scrub ewes and, what is much worse, a scrub ram and leaves the flock to shift for themselves under all climatic conditions and expects to make money from sheep raising is going to be badly disappointed in his profits. On the other hand the farmer who goes into sheep raising in the right spirit, gets a good pure ram and a good flock of grade ewes, who looks after his flock carefully at all times, especially during the lambing season, is going to reap full reward, for stock-raising is one of the most profitable branches of farming and sheep raising is one of the most profitable branches of stock raising for Tennessee.

IRON AS A PREVENTATIVE OF COTTON SEED MEAL POISONING.

By D. T. HARDIN, Fellow.

The use of cottonseed and cottonseed products as a feed for livestock was practically unknown before the Civil War. The seed were dumped into streams or anywhere to get them out of way. The scarcity of feed just after the war was largely responsible for the beginning of the use of cottonseed as a feed. Cattle and hogs soon learned to lie around the seed piles that had been dumped into waste places. It was at this time that people first learned that cottonseed and cottonseed meal were poisonous to live stock and especially so to swine.

The first record of any experimental work to determine the effect of cottonseed meal upon swine was done at the Kentucky Experiment Station about 30 years ago and all animals receiving the meal soon died. Since this experiment almost every experiment station in the country has done some work with a view to determining positively if cottonseed meal will kill swine, and if so what is the poisonous property in the meal. Several things, such as cooking the meal, souring the feed for a day or two and feeding the cottonseed meal in connection with green feed have been recommended as a means of decreasing the toxicity of the meal. But none of these changes made it possible to feed cottonseed meal with any degree of safety.

For the Southern farmer it is hardly practical to raise hogs on corn that is worth from 90c to $1.00 per bushel and to grow pork economically corn must be supplemented with some feed rich in protein, that will balance the ration as well as make it cheaper. Tankage, blood meal, soy beans and cow peas make a good supplementary feed for hogs, but these are very expensive. Cottonseed meal is by far the cheapest concentrated feed on the market for Southern farmers and has proved very economical when fed to any class of live stock, except when there were losses due to the meal. Cottonseed meal can be safely fed to steers to the amount of 6-8 lbs. per head per day for a period of 100 days, to dairy cattle 3-5 lbs. per head per day, probably indefinitely without any noticeable ill effects, but we have not been able to feed cottonseed meal to swine, even in small amounts for any period of time. A method by which we could safely feed cottonseed meal to swine should be a great incentive to the Southern farmer to raise more live stock and especially swine.

This we are no longer searching for, as it has been supplied by W. A. Withers and J. W. Brewster of the N. Car. Station. These men have probably done more work in an effort to determine the cause and remedy than any others in the country and at least have been most successful. Some one suggested pyrophosphoric acid as the cause of the poisonous principle in cottonseed meal. Withers and Brewster, after extensive experimental work in which several times the amount of pyrophosphoric acid in cottonseed meal was fed without causing death, and when cottonseed meal was fed with the pyrophos-

phoric acid extracted, death resulted as with normal meal. Thus they showed that pyrophosphoric acid was not the cause of the poisonous effect that results from feeding cottonseed meal.

In all experiments in which cottonseed meal was fed, the symptoms were noted and in general are as follows: When hogs begin to refuse cottonseed meal they usually show very rapid, short breathing, imperfect vision and often blindness, an acemic condition which shows in the paleness of the month skin and a weakening of the muscles of the legs and a very rough coat of hair.

These symptoms are similar to those of an animal suffering from sulphate poisoning hence the investigators were led to believe that some iron compound would act as an antidote for the poison in the meal. To this end a number of rabbits were fed cottonseed meal, 1 gram per 100 grams live weight and a small amount of molasses was added to make the meal more palatable. The rabbits began to die within 4 days and all were dead on the twenty-third day. This indicates that cottonseed meal will kill rabbits. Another lot of rabbits was fed the meal in the same manner as before, until some had died and others were sick, then a solution of citrate of iron and ammonia was added to the ration, 1 gram citrate of iron and ammonia to 48 grams of meal being used. The sick rabbits recovered and all gained in weight until the experiment was discontinued. This indicates that iron will cure animals suffering from cottonseed meal poisoning. Another lot of rabbits was fed meal with iron and ammonia citrate as above for 2, 3 and 4 months. Each consumed all the feed given and gained in weight until the feed was discontinued. This would indicate that iron will prevent cottonseed meal poisoning.

To determine whether or not iron would give the same results with swine, Withers and Brewster took a lot of 12 hogs and divided them into two groups of six each and fed cottonseed meal at the rate of 1 lb. per 100 lbs. live weight. One group was given iron sulphate along with the meal. At the end of 12 weeks four of the six hogs getting meal without iron were dead and the remaining two had made a very small gain, while the pigs in the group getting iron were all in a thrifty condition and had made a very satisfactory average gain.

At the invitation from Dr. Withers to all Experiment Stations to cooperate in the work, the Tennessee Experiment Station started an experiment on November 24th, 1913, with 15 shoats averaging about 64 lbs. each, to test iron sulphate and iron chloride as antidotes for cottonseed meal poisoning. The shoats were divided into 5 groups of three each and designated as group I, II, III, IV and V. Groups I, II and III were fed a ration of 1 part cottonseed meal and 4 parts cornmeal, lot II getting iron chloride and lot III iron sulphate added to their rations at the rate of 1 lb. of iron salt per 50 lbs. cottonseed meal. Lots IV and V were given a mixture of 1 part cottonseed meal to 2 parts cornmeal, lot V getting in addition iron chloride as above. At the beginning all five groups weighed practically the same

and were started on the same amount of feed. All lots consumed the feed given and gained very well during the first two weeks, but during the third week groups I and IV began to leave some of their feed. From this time until death or the close of the experiment the pigs in lots I and IV eat very sparingly, sometimes taking only one-third to one-fourth as much feed as the pigs in the groups receiving the iron. Lots II, III and V always cleaned up the feed given.

On the forty-fifth day one pig in lot IV died very suddenly and on the fifty-sixth day another pig in this lot died after lingering for about two weeks. None of the pigs in group I died during the experiment but two showed symptoms of meal poisoning for the last six weeks of the experiment and at the end of 100 days were only five pounds heavier than at the beginning of the test.

The pigs receiving iron were in excellent condition at the close of the experiment and showed an average daily gain of nearly one pound per day for the 100 days of the test.

The chloride and the sulphate seemed equally efficient in preventing poisoning. The pigs in group V made a little better average gain than the other two groups, but this was probably due to the fact that a larger part of the ration was cottonseed meal.

These with Dr. Withers' experiments seem to give conclusive proof that iron will prevent cottonseed meal poisoning and it is now up to the pork producer to cheapen the cost of production by making a large part of his hog ration from cottonseed meal.

THE IMPORTANCE OF HOME ECONOMICS IN RURAL SCHOOLS.

By MRS. OLIVE K. BARNES, Special.

The American farm problem of greatest significance to-day is not the conservation of the resources or increasing the fertility of the soil, but as Prof. Liberty Hyde Bailey says, it is the problem of "developing and maintaining on our farms a civilization in full harmony with the best American ideals." With the solution of this great problem, adjustment will be found for the minor problems. That the farm "is the cornerstone of our national prosperity is an acknowledged fact. One-third of our entire population gain a living strictly from the soil and indirectly all depend on it for sustenance and life."

Two great factors to bring about the solution of this great problem are the home and the school. It would seem only a natural course of events that the school should include in its curriculum some subject pertaining to home interests. Home Economics meets this crying need as it includes the consideration of all subjects which will adjust life in the happiest way. Home Economics advocates the training of the hand along with the development of the brain. The necessity for teaching this study in rural schools is shown by the fact that only one out of every five hundred country girls ever attend college. Why shouldn't the country girls be given

an opportunity to study this subject of such vital interest.

"The home is the heart of the farm but the home-maker is the heart of the home." On the home-maker devolves the most important task on the farm, that of making the home a pleasant place wherein to dwell. Much time and also much money is spent in learning how to conserve the farm resources, but the conservation of the time and energy of the home-maker is a new subject. This waste of time and energy is even a more serious question than the devastation of the forests or the waste of any of the natural resources. No home-makers are more unselfish and industrious than those who live on the farm. They are ever ready to sacrifice their time and energy for the good of their household.

A certain amount of work is necessary on every farm, but the usual time consumed in the performance of the duties of the household should be decreased at least one-third. Then the work would not seem mere drudgery. This condition may be realized by efficient household management. In the words of Miss Cooley, "training for home-making will give woman this power for she will understand the physical, religious, intellectual and aesthetic needs of her family and will be able to minister to them." Household management, as construed in Home Economics, has a greater depth of meaning than mere manual labor.

The preparation of food is one of the most important duties of the home-maker. "Wholesome and palatable food is the first step in good morals, and is conducive to ability in business and skill in trade." Much sickness, sorrow and even death results from improper food or food improperly cooked.

The girls becoming interested in home things seem worth the time and money it would take to maintain Home Economics in the rural schools. As Miss Jessie Field, of Iowa, says, "What's the use of farmers raising better stock and more corn, except to have money to make better homes? And how can we have better homes unless the girls are interested in and care for such things."

Mrs. Ellen H. Richards, who was the foremost leader in the development of the subject says that Home Economics stands for:

"The ideal home life for to-day unhampered by the traditions of the past."

"The utilization of all the resources of modern science to improve the home life."

"The simplicity in material surroundings which will most free the spirit for the more important and permanent interests of the home and of society."

With Home Economics as one of its fundamental subjects the rural high school will fulfill its mission by making the social and industrial advancement of its people possible. Better health and better social conditions mean better homes. Better homes mean happier homes. The happier the homes the more prosperous the nation will be.

POTATO CULTURE.

By W. W. ARMENTROUT, '16.

In thinking of cultivating potatoes, either in a large or small way the first question is where and in what kind of soil shall they be planted. Potatoes are grown almost everywhere in the United States and therefore on a great variety of soils. But in selecting the best soil for this purpose men of experience recommend a rich sandy loam, abundantly supplied with organic matter, with good drainage and preferably situated on a northern slope. Stiff soil may be improved by drainage and a liberal amount of barnyard manure and green crops.

After we have selected the place to plant, the next thing is to have the proper crop rotation. Perhaps the best rotation is sod followed by corn and that by potatoes. The small grains, especially rye, can be sown in late summer and turned under in the winter. There cannot be given any set rules as to the time or method of preparing the soil, but it should be plowed deep. The tubers are formed about six inches from the surface but the roots feed as deep as 15 to 30 inches. Deep plowing enables the roots to feed deeper and helps the soil to retain more moisture.

The question of manures and fertilizers is a very important one. The potato is a plant that requires lots of food and must have it in order to make a good crop. Barnyard manure is the best fertilizer when handled rightly but with improper management gives poor results. Fresh manure should never be put on a potato field at the time of or a short time before planting. It should be put on the preceding year and enough of it for both crops. If applied to potatoes it causes blight and therefore a short crop. Commercial fertilizers can be used to advantage if the soil has sufficient vegetable matter in it. A complete fertilizer should be used unless by previous soil tests it is found that one part is not necessary. It should contain an extra high percentage of potash. Special potato fertilizers are now being made which are very good.

Each community must judge for itself the proper time for planting. If an early crop is desired, plant as soon as it is possible for the young plants to be uninjured by freezes. The main crop should be planted so that the stage of greatest growth of the tubers will fall in a wet month. When a late crop is planted it should be done in time for the tubers to mature before freezing weather. Two crops may be grown in one season.

Potato seed should be carefully selected from hills which produce the greatest quantities of marketable tubers. It would be a tedious task to dig each hill and select, but usually the best vines have the best tubers. Mark the good vines and let them mature well, then select seed from them. Select a medium sized tuber and cut lengthwise into quarters. Experiments show that it is best to plant pieces of this size, while it is almost useless to plant very small pieces. The end in which there are many small eyes is the seed end and the other the stem end. The seed end

germinates earlier and for this reason each piece shall contain at least one of these eyes. Whole potatoes give a larger gross yield but the cost of seed cuts down the profits. Potatoes may be cut several days before planting and are not injured unless allowed to wilt too much.

Plant the potatoes in rows about 3 feet apart and drop the pieces from 10 inches to 15 inches apart. Cover not less than 4 inches deep and leave the surface level. Cultivation should begin soon after planting. It should be done with a common drag-harrow until the tops get a little ways through the surface. It may be well to cultivate deep the next time but afterwards only shallow cultivation should be employed. Do as much work as possible with the plow but by all means keep the field free from weeds. This will require some work with the hoe. Cultivate level because if dirt is piled around the hill some of the roots will be injured in the middle of the rows. Do not fail to cultivate; too many of us let the potatoes "make themselves."

It may be asked: is mulching a good thing? It is of great value in a dry season and takes the place of cultivation, but it is not practicable on a large scale, because of the great quantity of straw or leaves it takes to mulch a field. If used on small patches, expose the material to the weather for awhile so that any seeds in it may germinate, then spread over the patch.

Do not harvest until the tops are dead, for as long as they are green the tubers will continue to grow. Experiment shows that of potatoes planted May 20th one-third of the crop grew after September 1st.

The most common diseases among potatoes are the scab and blight. These diseases cut a crop short but may be prevented. For the scab, use rotation of crops. Do not plant potatoes in a place which produced scabby potatoes the year before. If you have seed which have come in contact with scab, treat them in the following way: to 30 gallons of water add 1 pint of 40% formaldehyde and soak seed for 2 hours before cutting.

Blight may be controlled by crop rotation and spraying. Spray potatoes with bordeaux mixture. This is made by dissolving 4 pounds of copper sulphate, adding 25 gallons of water. Slack 4 pounds of good stone lime and add 25 gallons of water. Mix the two solutions as they are poured into the spray tank. Start spraying when the plants are about 6 inches high and thereafter about every 10 days. To destroy potato beetles add ½ pound of Paris green to the 50 gallons of bordeaux mixture.

Why not raise potatoes as a money crop? Had you ever stopped to consider what good money there is in it? The grocery stores are now buying their potatoes from the North and are sending away the money that the farmers should keep here. We can raise them here and make money at it. Seventy-five bushels per acre is a very small yield and they are now worth 80 cents per bushel. Let's learn how to raise and store them so we can supply our home market and make money for ourselves.

STEER FEEDING AT THE TENNESSEE EXPERIMENT STATION.

By J. E. RING, Special.

The Tennessee experiment station has been for several years conducting some experiments in steer feeding. The object of these experiments is to find out the amount of beef that can be produced by one acre when planted to different crops. There are in the experiment seven, one-acre plots and the product of each acre is fed to 4 steers in a 60 day test. The double cropping system is followed on these acres. A small grain crop is grown during the winter and some cultivated crop is grown during the summer.

The crops on the acre plots are as follows: Acre I, Barley is grown during the winter and as soon as the barley is cut the ground is worked up and planted to soy beans. These ma- threshed, the stover is saved and fed to pen I. The yield from this acre the past year, 1913, was, barley, 1,512 lbs. (31.5 bu.), soy beans, 667 lbs. (11.1 bu.), stover, 2,235 lbs.

Acre II, Barley is grown during the winter and cowpeas during the summer. The yields were: Barley, 2,106 lbs. (43.9 bu.), cowpeas, 315 lbs. (5.25 bu.), cowpea stover, 1,615 lbs.

Acre III, Barley is grown in the winter and corn after it is taken off. Yields were: barley, 1,030 lbs. (21.4 bu.), corn, (1,395 lbs.) 25 bu., corn stover, 2,150 lbs.

Acre IV, Barley is grown during the winter and soy beans during the summer. These are cut as hay. The yield was, barley, 1,716 lbs. (35.75 bu.) and 3,455 lbs. of soy bean hay.

Acre V, Wheat during the winter and soy beans during the summer. The yields were, wheat, 1,390 lbs. (23.1 bu.), beans, 746 lbs. (12.4 bu.).

Acre VI, Winter oats are grown during the winter and soy beans during the summer. The yields were, oats, 1,998 lbs. (62 bu.), bean hay, 2,165 lbs.

Acre VII, Alfalfa is grown upon this acre. The yield was 8,140 lbs.

The 4 steers could not eat up all this in the 60 days but it was fed ad libitum. It took 98 days for them to consume all the alfalfa.

The beef yields, daily gains and feed per lb. gain were as follows:

	Beef yield.	Daily gain.	Feed per lb. gain.
Acre I	367	1.5	Barley 4.12 lb., soy beans 1.81 lb. Bean stover 6.1 lb., silage 13 lb.
Acre II	528	2.2	Barley 4 lb., cow peas .6 lb. Pea stover 3 lb., silage 9.1 lb.
Acre III	356	1.48	Barley 2.89 lb. corn & cob meal 3.92. Corn stover 6.04 lb., silage 13.5 lb.
Acre IV	537	2.24	Barley 3.2 lb., soy bean hay 6.43 lb., silage 8.94 lb.
Acre V	493	2.05	Wheat 2.83 lb., soy beans 1.51 lb., bean stover 4.15 lb., silage 9.75 lb.
Acre VI	505	2.1	Oats 3.95 lb., soy bean hay 4.29 lb., silage 9.5 lb.
Acre VII	346	.88	Alfalfa 20.63 lb., silage 13.87 lb.

These groups were all fed 20 lbs. per steer per day of silage in addition to the product of the acres. Much of this silage was made of corn stalks, after the corn had been removed, run into the silo and wet down by running a stream of water into the blower, or directly into the silo. This silage was of inferior quality since it was not wet enough in places and as stated above had no grain in it.

Group III made the poorest gains of any of the lots getting grain. The total amount of grain fed them was the highest of any, showing that with a poorly balanced or one-sided ration, such as corn, barley, corn stover and silage, poor gains will be made. This was a ration too high in carbohydrates. If it had been balanced with a protein feed like cottonseed meal, soy bean meal or hay or alfalfa, the results would have been much better. The rations of the other groups were very well balanced and more gains from less feed were made.

The Alfalfa group (VII) made the poorest gain of any. If they had been fed some grain as corn, barley, wheat or oats to supplement the alfalfa the results would have been quite different. The gains were quite slow with this group and at the end of the experiment they were in a poorer market condition than any of the rest, showing that cattle cannot be finished on hay alone even tho it is alfalfa, but must have some grain before the prime market condition can be reached.

All the grain in these experiments was ground but if one is not fixed to grind his grain he can feed it whole and follow his cattle with hogs and get equally good results.

The steers were kept in their stalls about 16-18 hours per day so about ¾ of the manure was dropped there. The manure from each group was returned to its respective acre. The result is that those acres that have a legume (beans or peas) are continually growing richer and on the corn acre (III), which has no legume, the yield is gradually diminishing. This fact is obvious at a glance at the plats in spring.

The steers fed were two-year-olds, a part of them having been carried thru last winter on silage and corn stover. With yearling steers kept rushed from baby-hood on, or baby beeves, gains can be put on with about 65% of the feed necessary for two-year-old.

One thing to be noticed in the experiment was that larger and faster gains were made where the beans were cut for hay in groups IV and VI.

The steers were bought at $6.25 per hundred and the average initial weight was 971 lbs. making them cost $60.69 per head. They have just been offered at $7.50 per hundred and the average weight at the end of the experiment was 1,082 lbs., which would make them bring $81.15, a gross gain of $20.46. The steers in a group then would gain in price $81.84. The cost of growing the produce of an acre is about $16.00 and the price paid the feeders for the 60 days was $5 per pen. There was 2.4 tons of silage consumed by each group of 4 steers. This at $2.50 per ton which is a high figure for silage would make $6.00 more to be taken off the gross receipts. This leaves a net profit of $54.84 per acre and the fertility of the ground has been increased

except where no legume was grown. The mineral elements, it is true, were drawn upon to some extent but these are not expensive elements to replace as is the nitrogen.

By feeding the alfalfa and corn in a ration together and buying a little cottonseed meal the gains could have been made somewhat cheaper and a little more profit made per acre. But $54.84 is a fine profit per acre and especially when the soil has not been impoverished to do it.

DRAINAGE.

By W. P. DAVIDSON, '17.

The subject of drainage is such a great one that I will only attempt to write on one phase, that of deep and shallow tile drainage. Drainage is absolutely essential to some lands and its practical benefits are soon recognized. The government is draining thousands of acres of land in Florida, Arkansas, and other states from which innumerable benefits will be derived. The question of time to put in drains is not so important. Generally the best time of year is when the farmer has least amount of work to do. I believe however that spring is the best time. The ground is usually moist at this time and all the seepy spots may be located, while in summer or dry fall these may be overlooked. The ground is more easily spaded in spring than in summer or fall unless it is a wet fall.

There are two classes of drains; open ditches and underground drains. Of these it has been proven that the underground drain is far superior to the open ditch. The open ditch soon fills up and briars, weeds, and bushes spring up along the bank, taking up valuable space. The use of much ground is lost in turning or avoiding the ditch whereas with the underground drain, the land can be plowed and cultivated right over the drain. This is important since land that has to be drained is generally rich. Moreover the time and trouble in turning and going around the open drain is eliminated.

There are two kinds of tile drains —deep and shallow. For low swampy land that is saturated with water, the deep drain is the best. But for overflows the shallow drain is practicable. In draining a pond that is filled with water by a gradual seepage from a hill, it is best to run a deep tile around the edge of the pond and catch the water as it seeps off the hill before it reaches the pond. But in draining a pond that is filled by overflow, it is well to run a shallow drain straight to the pond and cover the mouth of the drain over with rocks so that it will remain open all the time. This shallow drain need not be over eighteen inches below the surface, while the deep one should be something like three and one-half feet deep.

The question of size of tile is important. It is always advisable to use a large pipe for the main drain. A lot depends on the amount of water to flow through one, however, and an exact size cannot be stated for all purposes. Never use less than a five inch pipe, while the

eight and ten inch are the better size for mains. The cost for putting in a ten inch pipe, labor and all, is about eighteen cents to the foot; for eight inch twelve cents, six inch eight and one-half cents, and seven and one-half cents for five inch drain per foot. In putting in tile it should always be run straight and not crooked about as this takes up more tile and the more tile used the more money it takes. If there is a spring in the pond, it can be cased up and drained off through tile. From two to four inches fall per hundred feet will let the water run off fast enough. In running into a creek, the drain should always be turned down stream and have plenty of fall at the mouth. Each end of the drain should have iron rods fastened across the tile to keep out rabbits and other small animals. Where there are fences crossing drains it is best that the tile should be cemented since the roots of plants may grow into the tile and stop it up.

When it is not possible to empty the drain into a creek it is best for the farmer to co-operate with some of his neighbors and empty into a common drain. Carrying the water from a neighbor's field will necessitate the use of larger tile. A farmer is benefitted in letting the water from a neighbor's field through his drain from the fact that if it is not drained the water from the neighbor's field is liable to flood his land. It should never be attempted to drain too much land with a small main.

The fact that drainage is expensive is not disputed and should not be neglected on that account. A farmer in Middle Tennessee had thirteen acres of land that needed draining very badly. He made nothing whatever off the land, while his taxes on that land were the same as that on cultivated land. This thirteen acres was rich, as is usually the case with nearly all wet land. For ten years not a single crop had been gathered on it. The cost of draining was one hundred dollars per acre, or thirteen hundred dollars in all. The first crop raised was corn and of this he raised one thousand bushels. With such crops as this it is easy to surmise that the cost of draining would soon be paid for. Drained land stands drought better than other land. The drain acts as a suction where it empties into a creek or river and causes moisture to be given off, causing the land near the drain to be damp. The draining of swamps does away with mosquitoes, thus being a value from a health standpoint. The farmer is able to begin working his land several days earlier in the spring with the soil in good condition when the land is drained. He may expect that his winter grain and clover will not be injured by the heaving of the soil, as is the case with wet clay soils. He may expect his crops to endure the drought of summer with less injury than those on undrained land. He may adjust the rotation of his crops irrespective of the fact that some portions of the field are wet while others are dry. He may continue his cultivation during the summer without being obliged to avoid or go around portions of the field, which, by heavy rainfall, are made too wet for cultivation. It does pay to drain and no farmer should stand back on account of the cost.

A BOTTLE BABY.

By JAS. L. ROBINSON, '15.

His first recollections are of a large boxed stall, with a thick covering of straw on the floor and a single window placed far above his head to let in light and, with the half-open side next the hallway, to provide ventilation. The only other occupant of the stall was a little cow, scarcely any larger, in fact, than himself, for the double reason that he was an unusually large Jersey calf and that his mother, never having been called large, had seen only twenty moons. In truth, it might be said that the stall contained two calves, one a few months older than the other, but not so much older as to prevent good comradeship.

As the mother looked down upon her lusty son, she was impressed with his dark beauty; so dark he was that she at once called him black, and thought how he resembled his dark sire, who was widely known for his exceptional appearance. Then she fell to pondering on the unusual worth of her mate, for he had not come by his princely bearing through chance. In his veins flowed the mingled blood of a dozen great Jersey sires, some of whom had been ranked with the first of their time, and of as many great dams, that had officially been declared to be worthy of enrollment on the List of the Royally Great. Not the least prized of the accounts of the achievements of his ancestors was an oral legend of a dam who had made 16% butter fat test, something far ahead of any other well authenticated record in the history of the breed. But while she was proud of the excellences of her mate she was in no way awed by them, since she had brought to their union a blood merit scarcely less imposing than his own, whatever it lacked in lust being made up in recency. Her great-grandam was the mother of several very noted daughters, among whom was her own grandam with an Official Record of 743.7 lbs. of butter in a year, the second highest in the state. Her dam and sire could hold up their heads in almost any company, and both had hopes of soon seeing their own names on the Scroll of Honor. She was proud of her mate, she was not ashamed of herself; so no wonder, as she looked down on their promising offspring, that her heart swelled with pride to think that he was the product of the first young love of both.

But this mutual happiness was not for long, since on the second night a man in a white suit came and led the little mother away. Despite the dignity of his descent this royal offspring cried himself to sleep, for he was lonely there by himself in the large bare stall, with the square of moonlight streaming in. He missed his mother, she had been so companionable, seeming from the very first just like an old friend. At frequent intervals throughout the next day he would cry, but as the day wore on a note of distress became more and more prominent in his lusty bleating. At night the man in the white suit came with a bucket in which was some milk. He put his finger in the milk and then into the calf's mouth, then when the calf began to suck lowered it beneath the milk in the bucket.

The calf took one swallow and then threw its head straight up. The man repeated several times trying to hold down the calf's head, but with so little success that he soon became tired and left. It seemed to the calf that now he was hungrier than ever, but he slept through another night and the dairyman came again. After repeating the actions of the previous night he held the calf's nose under the milk till he was almost strangled, but he had learned to drink, and now that he had learned to drink from the bucket, he looked forward eagerly to the coming of the white-coated man.

After a week or two the dairyman took him out of the box-stall and put him into what seemed to him a much larger stall, with a great many windows and several partitions made of iron fences and gates. In the apartment with himself was another calf, of a fawn color, and looking through the iron gates he could see several others, most of whom were larger than himself. One day a man in a black suit and a round black hat came through the barn with the dairyman and another man in blue overalls, and said to them: "We have named this calf Moralfa Eminent Lansier." Listening to their talk Moralfa learned that his dam also had three names and his sire likewise, and that the last two names of his sire were the same as the last two of his own. Alf, however, (for this was the barn boy's name for him, and it stuck instead of the man's in the black hat) put on no airs with his companion.

Alf soon learned to eat, and it was a very choice diet that was offered him. Twice a day he was fed from a mixture of two parts wheat-bran, one part corn-meal, one part barley-meal. Sometimes oats were put in the place of the barley. Very soon he, with these other calves, was put on the terrace pasture, where they ate all the fresh grass they wanted. When Alf was about six weeks old, he noticed his milk did not taste as usual, and the feed boy said it was one-fourth skimmed milk; then it was one-half; then three-fourths; and in two weeks he was drinking skim milk. During this time his grain was increased and Alf did not seem to be any the worse for the change. He was also given a little hay occasionally; one kind, alfalfa, he liked especially well, perhaps because he liked the name. Every other day a little salt was placed in his trough, which he licked, and then how good the water in the big concrete trough in the yard did taste!

But not everything which he ate tasted good. Sometimes lime had been put in his milk, sometimes formalin, and on one well-remembered occasion it contained castor oil. One day he heard the dairyman say that his companion had the Pink Eye. He came back and washed the eyes with hot water and then rubbed some dreadful grease on them. Alf, too, took the same complaint and resisted fiercely when his eyes were treated. They were kept in the dark for several days, and Alf was soon well, but his little friend (for Alf had long ago outgrown the fawn calf) never saw clearly again.

One day when he came in from the pasture, the fawn calf had great news for him. The little man in the black hat had come in with a blue eyed youth and said to him, "You may

have this blind calf for your cotton seed feeding experiment." There was a note of pride in the fawn calf's voice as he told this, for it meant that by the risk, perhaps the loss of his own life, he would make it possible for other calves to be more safely fed. This pleased him since he had long known that he could never hope to be at the head of a fine dairy herd with a famous line of descendants. Despite his weakness he would be of use to his kind.

When Alf was nearly six months old the man in the round black hat, with the man in the blue overalls and the man in the white suit, again came through the barn. This time the little man in black was talking about having sold Moralfa for $75.00 and told the others a lot of things to do. The next morning the milk boy brought less milk in the bucket, and that day the foreman put a blanket on him. In a few days he came back and sheared the hair off of Alf's head, ears, and tail. Every day someone came and brushed him. After a few days he noticed a still smaller amount of milk in his pail and by the end of two weeks he was getting none at all. During this time the two calves often talked together, wondering what was meant by being sold and sent away, and whether the world where Alf was going, differed from their iron-fenced stall, and the lot, and the little terraced pasture on which they grazed. There even came a glint of curious expectancy into Alf's eyes as the day approached for him to leave. On that day a man came with a crate and fastened Alf in it. This was placed in a large wagon which the hired man drove away. Looking back Alf saw the barn, the pasture, and the lot full of other calves fade away. He passed by new scenes and through the busy noise of the city. When they came to a place where engines were puffing and blowing, his last acquaintance left him, to take a long ride alone. Once again he was lonely, but he was going out into the great big world.

SECOND ANNUAL BANQUET OF AGRICULTURAL CLUB.

By BESSIE DORAN, Specialist.

Never in the history of the University of Tennessee, has a more successful social function been given than the Second Annual Banquet tendered by the Agricultural Club to Mr. Geo. W. Callahan, as guest of honor and nearly two hundred members of the student body, Saturday night, March 21, at the Hotel Atkin.

The Committee, Mr. Farris, Mr. Powers and Mr. Harkleroad, who had charge of the affair managed the program very successfully. Not only was the menu splendid in every way but the table decorations and those little niceties which go to make a banquet all the more enjoyable were very evident. The colors of the school, orange and white, were used in decoration, and each lady was presented with a corsage bouquet of yellow roses and valley lilies, while the gentlemen received buttonaires of yellow and white blossoms. An orchestra, stationed in the balcony of the dining room added further to the enjoyment of the assembled guests.

Preceding the Banquet an informal

reception was held in the parlors of the hotel. The guest of honor and his wife were greeted by members of the Faculty and students who spoke words of appreciation for the substantial aid Mr. Callahan has rendered the Agricultural Club in times past.

Not a thing marred the enjoyment of the event from the grand march to the dining hall at 9:00 to the close of the Banquet nearly three hours later. Fun, wit and laughter were heard around the festive board, while the guests were favored by several solos from Mr. Seagle, Mr. Moore and Mr. Boal.

The place of toast-master was ably filled by Mr. O. L. Farris, '14, who introduced the speakers very cleverly.

Mr. W. P. Davidson responded to the toast "Freshmen," and the guests were kept laughing at his extremely witty remarks. Mr. Davidson proceeded to describe the representative types of the various departments. Said he "The Agricultural Freshmen are different from all other Freshmen for they choose the right profession and get a start on the others for the latter usually come two or three years before they find out there isn't but one course here and that is Agriculture." Such is the enthusiasm shown by the Agricultural Students and though all may not agree as to Agriculture being the *only* course, the Spirit and love for the work shown by the "Aggies" will be heartily commended by all who love their Alma Mater, and who know that it is only through the spirit of good fellowship that we can hope to draw the students closer in a bond of brotherly sympathy.

"Helpmates" was the subject of Mr. Fleming's toast. All he said was heartily endorsed and especially the part about progressive farmers being unable to live without cooks, and it was a few minutes before the applause subsided, at this truthful remark.

Mr. R. M. Murphy '10 one of the Alumni next addressed the guests, and plead for more unity among the Alumni he said that the College of Agriculture was growing to such an extent that this was necessary.

Mr. Ferris next introduced Mr. Flanery, who spoke on "Student Activities." The excellent suggestion made by Mr. Flanery that a committee be appointed from all the school organizations, to look after the social welfare no doubt will be acted upon at some future date, for many of the students expressed the desire for more frequent social affairs such as the Banquet of Saturday evening.

If each student present could grasp the scope of the work as represented by Prof. Morgan in his response to the toast "The College of Agriculture" then indeed would Tennessee be known for her progressive methods in agriculture. Professor Morgan laid stress upon the fact that Agriculture was the basis of the nations growth and that much depended upon the U. T. Student as to how he scattered abroad the ideas gained at the University. Prof. Morgan spoke of the warm hearted reception accorded university graduates in all parts of the State of Tennessee.

The response to the toast, "The Farmer and the State" was to have been made by Gov. Ben Hooper, but as affairs of state prevented him from being present. He expressed the desire

to attend the third Annual Banquet to be given in March, 1915, and we hope he will not be deprived of the pleasure, for one and all are assured that the affair will be worthy of a governors attendance.

At the close of the Banquet as a fitting climax, our stirring college song was sung with fervor and with feeling for it is dear to the heart of every student in the University of Tennessee.

"When College joys and College lays
Have faded with their makers days,
When Sol's swift wheels have made
us old
And College life's a tale that's told!

"Then Tennessee! O Tennessee!
Our hearts will ever turn to thee;
Thy honor, glory, fame, abroad we
sing,
With gladsome souls, we tribute
bring."

MILKING SHORTHORNS FOR TENNESSEE.

By THOS. L. ROBINSON, '15.

From the very origin of the breed, Shorthorns have had two qualities to commend them to the favorable consideration of farmers and stockmen. These are their dual capacity for both beef and milk production and it is this that has made them so popular.

Tennessee is rapidly coming to face the question of conserving her soil fertility and it is generally recognized that this is most economically done by the growth of cattle or other live stock. We must keep up the fertility of the land; hence, we must keep cattle. We must have beef, hence we must raise something besides an udder and a pile of bones and skin.

If we are going to grow cattle, we must sell cream and raise a fairly good beef animal out of the calf. Men are soon going to quit selling their big calves just at the age when they begin to return fertility; then sell their feed also and permit some other fellow to get the profit from laying on the finish and at the same time enrich his farm from the deal.

In view of the present situation in beef production, Austria now has a law making it an illegal act subject to fine and imprisonment to kill female cattle.

Shorthorns, as beef producers, are known throughout the civilized world but their dairy qualities, though excellent when properly developed, are not so well recognized and need advertising and further development. The early history of the breed furnishes many instances of cows that were great producers. Although Thomas Bates bred for beef form he developed cows that gave from 24 to 36 quarts of milk per day and their descendants proved good milkers for several generations. Numerous public dairy tests of Shorthorns have demonstrated the ample capacity of this breed at the pail.

Only about a year ago, a cow owned by Avery of New York, produced 15,592 lbs. of milk and 831 lbs. of butter, showing her milk to be very rich

in butter fat. At the last sale of George Taylor, a Shorthorn breeder in Great Britain, 30 cows showing an average of over 1,030 gallons with their last calves were sold, all of the Bates blood.

This breed is not lacking in high priced animals either as 53 head sold by Robert Hoobs brought an average of $317 per head. Sir Gilbert Greenhall, an Ireland breeder of dairy Shorthorns, paid $1,320 for a roan cow Barrington Crawford 17th. At the same sale a six-months-old bull calf whose dam gave 12,000 lbs., brought $901. This calf was sired by Oxford Record for which $2,200 was realized.

One of the most frequent objections to this milking strain of Shorthorn is that you cannot have both milk and beef in the same animal and that the one cannot be developed without loss of the other. No domestic animal responds as rapidly and readily to evolution as does the cow. The modern beef steer has been developed from the long horned Texas, and from the scrawny dairy cow of centuries ago we have developed the ideal Jersey and Holstein of today. Why not a few steps further and combine these two desirable, non-opposing characters in the same animal? Broad loin and rumps seem just the place for the growth of the finest quality of beef, and equally the proper support of a capacious udder. No difference in the chest, abdomen, digestive organs or in the vital organs is necessary to fit them exclusively for either purpose.

Another objection to dairy Shorthorns is that this is an age of specialists and that we should have cows adapted to one particular purpose. One readily sees that this view is too much one-sided and the man who can handle a cow in a way to get the most milk and butter, and also feed her progeny to cause it to obtain a high degree of beef quality, is fully as much entitled to the word "expert" attached to his name as any other skilled laborer.

Farmers want dual purpose machinery and why not the dual purpose cow. The Shorthorn people have come nearer keeping to the dual purpose type than any other.

Without doubt, dairy Shorthorns with milk records ranging from 10,000 to 13,222 lbs. are worthy of the careful consideration of Tennessee men who want cows that will pay their way as dairy animals. Such cows are well suited to present-day Tennessee farm conditions and men producing the same would have a profitable market for their surplus.

AWAY WITH THE COW.

London, March 17.—The Times describes the discovery in a London chemical laboratory of a process manufacturing synthetically a pure and wholesome milk of high nutritive value from a basis of cassein obtained from the soy bean. Excellent cheese and butter, the Times says, have been made from this synthetic milk.

The above news item inspired Phil S. Taylor of Jonesboro, Tenn., to write the following:

Away with the Cow—we need her not—
Away with the Jersey flock,
Farewell to "Cherry," good bye to "Spot,"
They're doomed to the butchers' block!

Good-bye to the tinkling evening bell
Of "Huldy," homeward bound;
Good-bye to the tales that men do tell
Of the "record cow" they've found!

So long, to the good old cedar churn —
We'll let its dasher rest;
No more the De Laval we'll turn,
Nor use the Babcock test!

Adieu to the Ayrshire and Brown Swiss
To the Guernsey and Holstein—
All hail to MORGAN *who taught us this:*
Grow ye the Great Soy Bean!

PHIL S. TAYLOR.

Jonesboro, Tenn.

THE U. T. FARMER

Scientific; therefore practical

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EDITORIAL.

The public school system is maintained that we may have better citizens. To accomplish this end it must educate the pupil in terms of his daily life. This will necessitate a very close relationship between the school and the home. The work of the school should undoubtedly reflect the home industries, and reveal the higher possibilities of service in the immediate community life. It should be the aim of the system to bring the school to the home instead of the home to the school. We do not wish to criticise, or leave the impression that we have fallen off the wrong side of the fence and are sore. Our present system of common schools in many cases, no doubt, inspire and create a desire for something better, but too often it fails to provide the means of legitimately satisfying this desire. Some of the courses offered tend to be superficial and are calculated to prejudice the pupil against and disgust him with his own conditions. This state of affairs, however, is being greatly improved by the introduction of Agriculture and kindred subjects in our public schools.

Agricultural education is now filtering down from the higher seats of learning to the public schools. There are 2,000 public high schools in the United States teaching Agriculture to-day, whereas sixteen years ago not one offered such instruction. The rapid extension of this movement may be appreciated when it is known that in 1909 less than 350 institutions taught Agriculture, in 1911 less than 900, while now about 2,600 offer such instruction. With such rapid strides as this it is only a matter of a few years till we will have Agriculture and kindred subjects taught in all public schools, especially in our rural public schools.

In the last issue of this magazine we mentioned the relatively low standing of agriculture as compared with other professions and attributed this condition partly to the lack of sufficient recorded facts, or in other words to the lack of "accumulative experience" in the field of agriculture. Yet this lack of available information is not sufficient to account for all the existing conditions. The

farmer, himself, is partly at fault for not exhausting the material which is available. Much more information is within easy reach than the average farmer even suspects. He is especially fortunate in having a large amount of valuable reading matter which he can get very cheaply. The Government, both State and Federal, have a mass of publications which embody most reliable information upon every phase of farming. These are sent free to every farmer who will but ask for them. There is nothing at all, then, to prevent every farmer from having a large supply of these government publications in his library.

The next and one of the most popular sources of information is the Farm Paper. This publication needs no introduction as it is found on almost every farm and, as a rule, is quite thoroughly read. There is, however, one thought we should like to drop here in connection with the relation of the Agricultural paper to the Farm Library. In order to get the full value of any printed information it must be kept on file so that it may be reviewed when desirable. These Agricultural papers should be carefully filed away; then when a question arises the papers may be looked over for several months back and, as a rule, the answer will be found. The need of such a filing system is fully realized when one reviews several numbers of a paper and sees the identical question asked and answered in almost every issue. If a file is kept such unnecessary repetition will be eliminated and what is of greater value the inquirer will have an immediate answer.

The Farm Library should also contain several of the leading Agricultural books. Of these there should be at least one good text on feeding of live stock, one on breeding, another on live stock judging, and one or more on soil and crop discussions. If special farming is followed books along that particular line should be secured.

Besides this strictly agricultural material, the Farm Library should, by all means, contain a few of the leading religious, poetical and fictitious works. If time is taken to read these, much more pleasure will be gotten from the farm life.

The above is probably all that the average farmer will need in his library but he may so manage that even expensive volumes might be at his service. This may be done through the High Schools where the whole community has the use of the library. Through the High School or through some local farmer's organization he may also secure a case of the Free Circulating Library which is sent free by the Board of Education to any such institution. These libraries contain a collection of exceptionally select books.

In order to install this complete Farm Library it will cost several dollars but the farmer must consider that the library is just as essential to successful farming as the plow, the harrow or the grain drill. With the latter we may plant and cultivate a crop but it does not follow that we have made a success. Many an acre of corn and wheat is grown at an absolute loss to the grower. Labor alone does not always bring results; but labor coupled with the proper proportions of brains will. It is partly from this point of view, the

economic side, that we advocate a good Farm Library.

But as many farms are run now a library would be absolutely useless. Where fourteen hours are spent in the field, no time can be given to study. This condition should be changed. The best results cannot be gotten where all the time is spent in labor and none in planning and in study. We would venture to say that if such farmers would spend ten hours at work and one or two each day at studying their problems, the end of the year would find them farther on financially and stronger, physically, mentally and morally.

Nor are these latter benefits, the physical, mental and moral by any means to be considered second to the financial. Mere dollars becomes a small factor when compared with real happiness on the farm, and happiness must be the result of good health, a strong active mind and a clear conscience. Over work cannot bring these. It is bound to make farming a drudgery, but where work and study alternate each is a time of recreation and neither becomes drudgery.

We believe that until each farm is a place of study as well as of labor, farming cannot reach its uppermost limits; and as the Farm Home Library must play the leading role in bringing about this condition we hope that the time will soon come when the farmer will feel as much at a loss without a good library as would a doctor, a lawyer or a preacher.

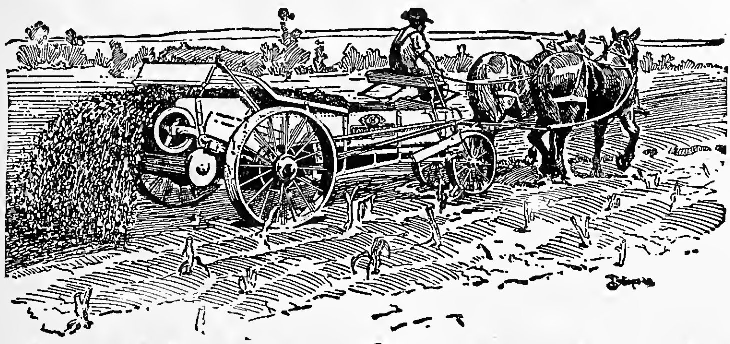
NEWS.

The Tennessee Experiment Station has sold six pure bred Jerseys recently. They have gone to South Carolina, Arkansas, Mississippi and Tennessee.

The Station has bought some pure bred Southdown sheep to do some experimental breeding.

A couple of weeks ago short courses were held at Riceville and Sparta, Tenn. The courses were given under the supervision of Professor Keffer and R. M. Murphy.

Greatest feature ever pulled off by the Agricultural Department was the Banquet March 21. It was given at the Atkin Hotel, serving 173 plates. The occasion will be so memorable that we expect 50 Alumni to attend next year.



Salt Values

In butter making there are two great values in the salt you use, purity and grain, and each quality has its peculiar value. On the purity depends in a large measure the flavor and keeping qualities of your butter. On the grain depends the body and texture of your butter and the amount of salt that can be incorporated, which is represented in the over-run.

Purity

Ordinary salt contains many natural impurities, such as the chlorides and the sulphate of lime or gypsum, all of which are more or less harmful. These impurities not only detract from the keeping qualities of your butter but add strong, bitter flavors. Pure salt is clean and sweet tasting and can be carried in large quantities without making the butter appear oversalted.

Grain

Coarse grained salt (like Diamond Crystal) will in the majority of cases make more weight than fine grained salt. It dissolves more readily and without wasting, adding a maximum of the salt used to the butter. It incorporates evenly and thoroughly and avoids the danger of gritty or mottled butter, admittedly the result of undissolved salt.

In Diamond Crystal Salt all the different values are combined. It possesses the good qualities required in a perfect butter salt. It analyzes over 99 per cent purer. It has the proper grain. The package is right. Its value is not theoretical because it gives results. That's why so many big creameries use it.

Put up in 14, 28, 56 pound sacks for the convenience of the small user, as well as in barrels. Write us for prices.

Diamond Crystal Salt Co.

St. Clair, Michigan

THE U. T. FARMER

DAIRY HERD GRAZING—VALLEY VIEW FARMS.

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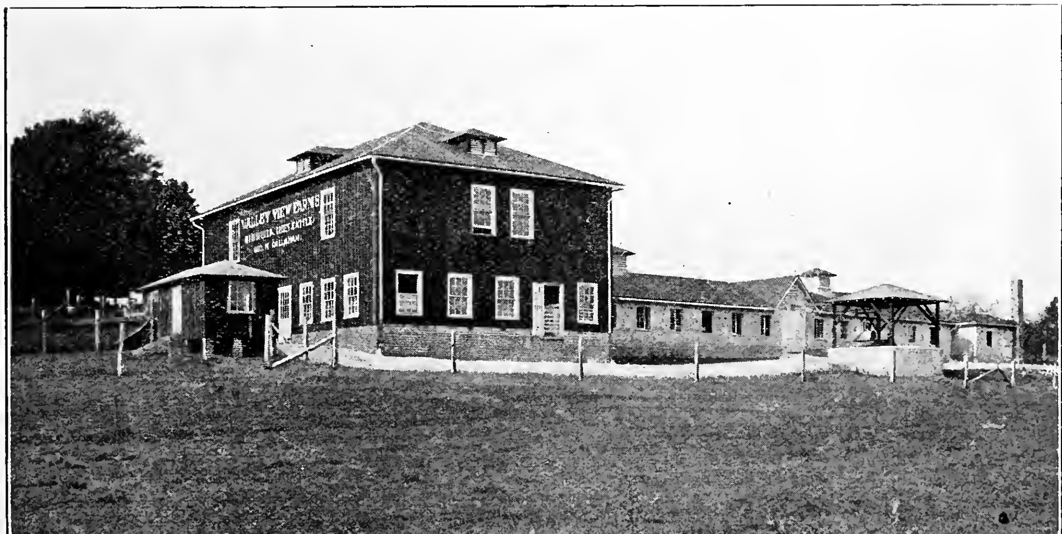


Exterior of Dairy Barn—Valley View Farms.

THE U. T. FARMER

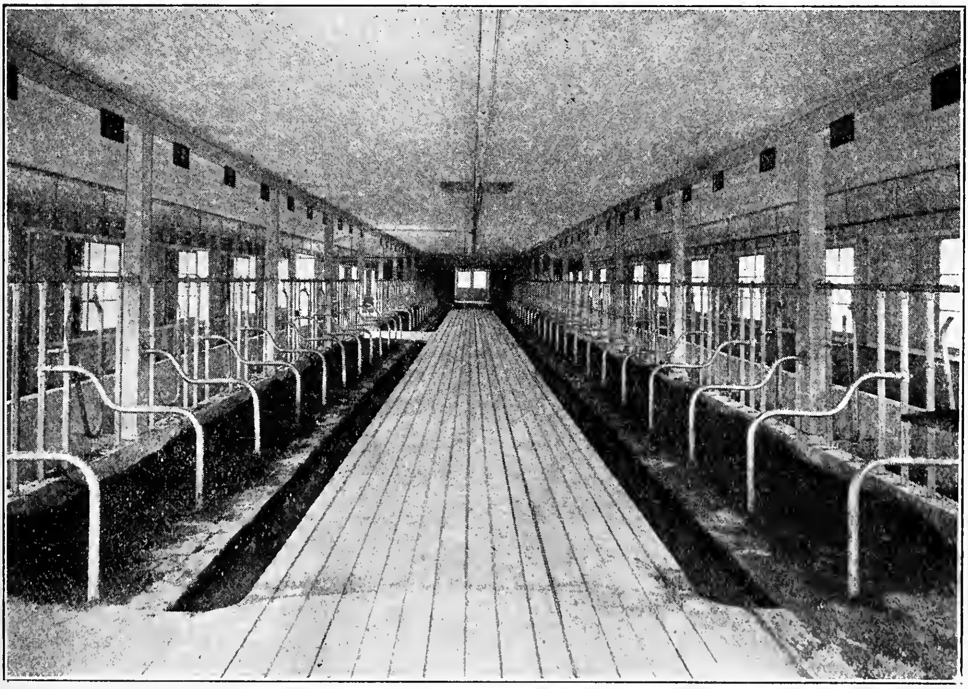
Vol. 8. MAY, 1914. No. 8

VALLEY VIEW DAIRY FARM.

By J. B. BAKER, '16.

The first thing which strikes the eye of one reviewing a dairy farm is the sanitary condition under which the milk is produced and handled. Milk is one of the best of human foods when it is first drawn from the cow. It is also one of the most easily contaminated. It affords a medium for the growth of injurious bacteria which has no equal. Much has been written and spoken and a great many experiments and tests made by the U. S. Government and experiment stations on the importance of sanitary production of milk and other dairy products. Officials of city boards of health have tried to establish regulations by which the sale of unsanitary milk will cease. Yet, in spite of all these efforts there are many dairymen who fail to comply with these regulations. They do not seem to realize that it is to their advantage to produce the best milk possible; that their products will be better advertised, and that they can demand a better price under sanitary conditions than otherwise.

The Dairy Division of the U. S. has long recognized the importance of improving the sanitation of mar-



INTERIOR OF DAIRY BARN—VALLEY VIEW FARMS.

ket milk. To help meet the poor conditions found, some few years ago it began to draw plans for modern, sanitary dairy barns and buildings and supervised the erection of these buildings. Two years ago such a barn was erected at Valley View Farms owned by Mr. Geo. W. Callahan, Knoxville, Tenn.

This barn is strictly modern throughout and meets every requirement of sanitation, comfort for the cows and economy of time and labor in caring for them. It is erected on a gentle slope which gives it the best possible drainage. The shape of the barn is that of the letter "T" and the structure frame, erected on a brick foundation. The cow stable is on the east side of the main barn and is only one story high. It is plastered on the outside with concrete. After the frame work was erected it was covered with metal lathing and the concrete placed on this lathing forming what is known as a "Stucco" arrangement, on the inside of walls is also stucco to a height of about three feet from the flour, which makes it more sanitary than it would be if constructed of wood. The main part or wing of the barn is two stories high. The lower story is used for calf stalls and maternity stalls. The upper story is used as a store room of feeds. It also contains machinery for crushing grain and cutting hay, etc.

In the cow stable are 48 stalls for milk cows, arranged in two rows with the cows facing the walls. With the many windows, this arrangement gives the cows plenty of sunlight and fresh air, which is very essential in keeping the cows in a healthful condition. It also affords ease and economy in caring for the cows.

The floor, mangers and walkways are all made entirely of concrete. The cows are fed and watered in the same manger, making it convenient in bad weather when the cows are kept indoors. The platform where the cows stand is covered with cork brick which gives more comfort to the cows, not being so cold and hard as concrete.

The stalls are made of a single pipe on each side extending from a Porter swing stanchion frame back to the floor near the gutter. The Porter swing stanchion confines the cow to her stall and the gas pipes prevent her from tramping on her neighbor. This is a most sanitary stall as there are no cracks in which dirt and dust may accumulate.

There are two large concrete silos each 16x32 ft. having a combined capacity of 260 tons conveniently at hand to furnish silage for most of the year.

All feeds are conveyed to the mangers of the cows by means of chutes and carriers which run on overhead tracks.

The manure is removed by means of a litter carrier which also runs on an overhead track. This is dumped into a small concrete pit and hauled to the fields daily when the weather permits. The pit was made small to prevent the accumulation of manure. This method of handling the manure prevents the loss of fertility and also prevents unsanitary conditions.

At the east end of the cow stable

is a small milk room connected to the stable by means of a covered walkway. This contains the boiler, washing vats, Babcock tester, milk cans, etc. From this room the milk is conveyed as soon as possible by means of a cable carrier to a concrete spring house, some fifty yards down the hill, and submerged in cold water. From here it is delivered once a day to the Knoxville Pure Milk Company in an up-to-date auto milk car.

Not only are the barn and milk rooms in an ideal sanitary condition, but the barn yard, is also as clean as a new pin.

Mr. Callahan recognizes that the interior of the barn can not be kept clean with the yard full of mud and manure. The yard is graded and covered two or three inches deep with crushed stone.

Another thing to be noted on this farm is the saving of labor with machinery. Mr. Callahan has just installed a four unit Sharples milking machine to do his milking. This saves the labor of two men and makes it easy on those doing the milking. Everywhere machinery can be used to an advantage it is used. The milking machine seems to be a great success.

There are 95 head of registered Jerseys on the farm, 52 milkers, three of which are imported and some out of imported stock, and 43 head of young stock. The herd is headed by three high class imported bulls, Devotion's Noble, Barons Golden Noble, and Undulatta Rosebay. The last was Junior Champion and Grand Champion at the National Conservation Exposition in 1913. The first is sire to the famous bull at the head of the Elmendorf farm at Lexington, Ky. Some one has said "show me a high class bull at the head of the herd and I will show you a good herd." This also seems to be Mr. Callahan's belief.

On account of lack of help milk records are not being kept just now. They have been and are to be continued as soon as possible. Mr. Callahan recognizes that it takes more than merely registered cows to make a profit and build up the breed. The poor cows must be weeded out by means of milk records.

Although every dairyman might not be in a position financially to duplicate Mr. Callahan's methods of running a dairy, I am satisfied that it would be worth the time and money to visit this farm and, at least, observe the modern methods being practiced. In the many different departments, the farm (1700 acres) furnishes inviting fields of study and investigation for both the student of Agriculture and practical farmer.

CORN PRODUCTION.

By HORACE CALDWELL, Special.

The average corn production of Tennessee is 22 bushels per acre. There is no doubt that this same land would have produced 75 bushels per acre one hundred years ago. If the present methods of cultiva-

tion are continued it is only a matter of a few years till the average farm will not produce a living for a family.

Most farmers think they know all there is to be learned about raising corn. If they get 50 or 60 bushels per acre it is a bumper crop and they feel that the ground produced to its limit. Yet, a little school boy in South Carolina in one year produced 256 bushels on one acre of ground. Of course that was exceptional but it ought to be an eye-opener to most corn farmers.

Jerry Moore could produce 256 bushels of corn on an acre because every grain that was planted came up and the corn was given a chance. The ground was prepared and the corn properly cultivated. He first found out what corn required to produce the greatest yield, and then went about the work in a business and common sense way and did what any farmer would have said was impossible. Since then there has been a great number of farmers that have produced more than 200 bushels to the acre. Any man can greatly increase the corn production of his farm if he will observe the laws of plant growth.

There are a few essentials that must be observed in order to produce the maximum yield of corn.

1st. The proper selection of seed.

2nd. A sufficient amount of plant food.

3rd. A properly prepared seed bed.

4th. Planting at the right time.

5th. Proper cultivation.

The selection of seed and preparation of seed bed are most important and often most neglected by farmers. Many farmers go to the crib to select seed corn and wonder why the stand is so poor. Corn is often put into the crib in a damp sappy condition and soon develops a fungus or freezes during the winter. Either of these may kill the little corn plant and leave the grain appearing sound and healthy. If the plant is not killed it may be weakened so that it is not able to grow into a healthy stalk.

The place and time to select seed corn is in the field while the ears and stalks are growing. Have an ideal in mind and select stalks with ers. Many farmers go to the crib to your ideal.

To withstand wind and storms the stalk must be large and the ear growing as near the ground as possible. This also makes it easy to gather. If the corn gatherer has to hold his arms above his head all day it is very tiresome.

If a stalk has two ears it is a good idea to use it for planting, although the ears may not be quite as large as you like, yet you may develop a strain that will produce two ears all the time. Select ears that grow close to the stalk and are well filled out at both ends. Do not select ears growing near a barren stalk because pollen from the barren stalk may have fertilized some of the grains. Select ears growing on stalks that are growing along side other stalks. A stalk that can produce a large ear when growing by its self may not be able to produce a large ear if it has to compete with other stalks. By this manner of selection any farmer can take the corn that has

been grown in his neighborhood for years and soon produce a strain that will excell in quantity and quality over any strain that he may import from other states because native seed can always withstand adverse conditions of soil and climate better than imported seed.

After the corn has cured well gather, husk, and dry thoroughly by spreading on the barn floor or anywhere air may have free access to it. After it has dried sufficiently store the ears where they will be secure from rats, and keep dry. It is an easy matter to make a wire rack of your own contrivance on which to keep your seed corn. A very simple affair is a frame made by fastening a number of thin boards together and driving spike nails about four inches apart and impale the ears on the points of the nails. Then hang the frame to a joist or place it where the rats will not get to it. Corn treated in this way will guarantee a strong vigorous strand when planted under proper conditions. Yet, to leave no doubt as to the vigor of the seed each ear should be tested before planting so as to be sure about every grain that goes into the ground.

The next most important point in corn culture is a deep mellow seed bed. There should be a green crop to turn under in the spring in preparing corn land but if you have no green crop to turn under, the ground ought to be turned in the middle of the winter, if possible, so as to soak full of the spring rains. The deeper the plowing the more water will be stored up for the crop. The frost and freezes will help mellow the soil and make it easy to disk when it comes time to plant. Harrow or disk till all clods are pulverized. Plant the rows north and south where possible so every blade will get as much sunshine as possible.

Most farmers are very much afraid that they will get their corn planted too late. Consequently most of them get it planted too early. If one happens to be a few days later than his neighbor in getting his corn planted he feels almost disgraced. Corn is naturally a heat loving plant and should not be planted till the ground is thoroughly warm and cold spells over. The bacteria will be well at work preparing plant food for the little plants. This will secure a good stand and strong vigorous plants to start the crop. If the growth of young corn is checked by cold weather it will be stunted all the way through. It scarcely pays to replant corn for replant stalks are always overtopped by other stalks and never do very well.

When the planting rush is over most farmers begin another rush to get "laid by." They have a certain number of times to plow the corn. When the corn has been plowed the set number of times the farmer feels that he has done his whole duty towards the crop. He feels that the plowing was very poor if the double shovel did not go down about 6 or 8 inches and break off all the corn roots possible. Corn should be cultivated 3 or 4 inches deep after each rain in order to keep a mulch on top of the ground to prevent evaporation. If the weeds are very bad, of course, they should

be kept down by cultivating oftener if necessary. If the seed bed is well prepared the deep cultivation is not only unnecessary but is absolutely hurtful to the corn. If you plow deep do it in the middle of the balk but not near the row. Continue cultivating till the corn is so large that it prevents the team and cultivator from getting through, so, as to preserve the moisture when needed most.

SUMMER SPRAYING.

By O. M. WATSON, Special.

The old saying that "an ounce of prevention is worth a pound of cure" is particularly applicable to summer spraying. When our plants are half dead from some disease, our fruit rotting or full of worms or the foliage almost eaten up by some insect; we cannot then hope to gain very much from spraying. We should be prepared to spray and then **spray** when the right time comes.

Sprays are divided into two general groups—Insecticides and Fungicides. Very often the two are put together and applied at the same time.

Insecticides are also divided into three groups—stomach poisons, contact poisons and repellants.

1. Stomach poisons are those used to kill insects that chew their food, like the cabbage worm and potato bug. Paris green and arsenate of lead are used for this purpose more than any others; the arsenate of lead being preferable to Paris green as it is less caustic and sticks much better. This should be applied as

Spray Before the Tree is Injured.

soon as there is the slightest appearance of damage by chewing insects.

2. Contact poisons are those which kill by coming in contact with the body of the insect.

These are used to kill insects that get their food by sucking. Lime sulphur and kerosine-emulsion are most used.

The contact sprays are not much used in summer spraying; for the spray, when strong enough to kill the insect, will also injure the foliage of the plants.

There are times when the contact spray, used in connection with a trap crop, will pay well.

There are some vegetables of which insects are more fond than others.

The Harlequin bug likes mustard and radish better than cabbage and if rows of these vegetables are planted in the cabbage field; the bugs will be attracted to them and can be killed with a strong contact spray. Of course the mustard and radish will be killed but as the seed are so cheap this method can be used with profit.

3. Repellants are insecticides that drive away insects.

Tobacco solution or a weak carbolic acid solution are often very effective when sprayed either upon or around the plants or both.

Care must be exercised in using this method, as a very strong solution may injure the foliage.

The Fungicides are the sprays used for the prevention or spread of fungus diseases, like the brown rot of peaches or anthracnose on the leaves of melons, etc.

In most fungicides copper and sulphur are the most active elements. Until recently copper sulphate or blue-stone with lime and water making Bordeaux-mixture was almost wholly used. The standard Bordeaux-mixture is:

4 lbs. Copper-sulphate.
4 lbs. Quick lime.
50 gallons of water.

A number of experiments have shown, however, that a smaller amount of copper-sulphate is just as effective and very much less caustic.

The use of 2 lbs. Blue stone, copper sulphate, 4 to 6 lbs. quick lime and 50 gallons of water will give excellent results.

Unsprayed and Sprayed Apples.

Self-boiled lime-sulphur has proven very effective as a fungicide. For its preparation and use see Bulletin No. 98 of Tennessee Experiment Station, pages 50-52.

For the small orchardist the use of commercial lime-sulphur (1 gal. to 50 gals. of water) will likely prove more satisfactory, as it is well mixed, thoroughly strained and only needs mixing thoroughly with water

to be ready to apply. In a small way it is probably more economical than the self boiled solution.

When to Spray.

Commence to spray before any serious damage has been done. In the case of the peach and apple the first spray should be applied as soon as the bloom is dead. With the tomato as soon as the plant commences to bloom. With the potato as soon as the first eggs begin to hatch.

Your attention is called to Tennessee Experiment Station Bulletin No. 88 on Insuring the peach crop.

It is not necessary to discuss the question as to whether or not it pays to spray or whether or not you can afford to spray. You simply cannot afford not to spray if you expect to have a first class supply of fruits and vegetables for home use or for the market.

BROODING YOUNG CHICKENS.

By LYNN MORRIS, '17.

The brooding of young chickens is one of the most important phases of the poultry industry, because the marketing and breeding value of a bird depends almost entirely upon the success with which the chicken has been raised.

To grow young chickens successfully you must have a good foundation, and the foundation is the parent fowl. This means that the parents must be strong, vigorous, healthy, and well bred. They should be given the best of food and water, and be kept in as comfortable quarters as possible; and the eggs from these birds will hatch strong and vigorous chicks.

If the chicks are to be brooded by a brooder, it should be started a day or two before the chicks are to be put in, as the heat can be more easily kept uniform from the beginning of the brooding period. The brooder should not be exposed to cold rains and winds. Better results will be obtained if the brooder is in an open-front house facing the south or southeast. The house should be dry and well ventilated at all times. After the chicks are dry and strong (about 36 hours old) they are transferred from the incubator to the brooder. Be sure not to disturb the chicks until they are strong and dry, or you will cause weaklings and probably lose a goodly percentage of the brood. All crippled, deformed, and weak chicks should be killed, or, if not killed, at least separated from the strong healthy ones. Be sure that you do not crowd the brooder. If crowded, they are more liable to disease, and do not grow so fast. The chicks should be confined to the brooder for a week or two, then allowed out in a run until they are about two weeks old, and thereafter, given free range if possible.

All brooders are overrated. As a general rule, it is better to divide the rated capacity by two. There can be no definite amount of heat

for a brooder, because the weather and chicks cause the temperature to vary. Study the brood. If they crowd to the heat, they are too cold and may smother. If they have their wings spread, mouths open, and crowd to the ventilating holes, they are too hot. Crowding around draught holes may cause them to take cold, and bring on other more serious diseases. As stated, the temperature varies; but the following is a very safe mark: 95 degrees F. for the first four days, 80 to 90 degrees the next twelve days, and thereafter the lamps need not burn except at night or on cold damp days. Keep the brooder in the sunlight as much as possible, but do not allow parts of it in the sun or the chicks will crowd for the sunny places. Keep pure fresh air in the brooder at all times. Keep the floor of brooder dry. A thick paper covered with sand or earth may be kept on the floor. The paper helps in cleaning. The brooder and surroundings should be cleaned and disinfected at least once each week and even more frequently in hot weather. Keep the lamp-wick trimmed evenly so that the blaze will be broad and uniform. After the chicks are seven or eight weeks old, the brooders can be taken away and low roosts put in their places. When this change is made, the chicks should be watched and made to roost on the roosts.

If the chicks are to be brooded with hens, the hens should be thoroughly dusted when they are taken off, and this dusting should be repeated every two weeks, or oftener, if lice or mites are present. The dusting should be done with some good commercial insect powders that are fresh. The hens should be confined in a coop that is not exposed to cold rains or winds. A coop in an open-front house facing the south or southeast is preferable. The chicks should be allowed the freedom of going in and out of the coop as they wish. When the chicks are ten days or two weeks old, the mother hen may take them about the yard after the dew is off, if the weather is warm and dry. The coop and its surroundings should be cleaned and disinfected once each week, and oftener than this in hot weather.

Clean, fresh water should be before the chicks at all times, after they are put in the brooder or pen. There is no iron-clad rule as to what the chickens should be fed, but they should be fed often and at regular times. I have found the following feeds very satisfactory: for the first two days, the yolk of hard-boiled eggs or browned bread soaked in sweet or sour milk and allowed to drain. Feed this about four times each day and just enough to be cleaned up in fifteen or twenty minutes. Do not feed sour and sweet milk alternately, nor change from one to the other, for it will cause indigestion. Do not feed the chicks at all until they are from 48 to 60 hours old. After feeding them on bread or eggs for two days, gradually replace this food with ground grains, ground fine and mixed in the proportion of corn 100 pounds, wheat 80 pounds, oats 60 pounds, and barley 60 pounds. This can be fed in a litter or hopper. By the time the

chicks are ten or twelve weeks old, the feeding periods may have been gradually lengthened to three times each day. Be sure that the grains used are of good quality. Do not feed screenings nor chaffy oats. Feed food that is fit to be eaten by yourself. For a change of ration, soaked bread-scraps may be fed occasionally. But they should always be well drained.

Fresh bone and beef scraps in small quantities should be fed two or three times each week. Fine grit, oyster shells, and green food should be where the chicks can get them at all times. Do not neglect this, for it is very important. Natural animal-foods, such as worms and grasshoppers, take the place of beef and bone when they are accessible.

All drinking cups should be scalded every week. Where milk is fed, the vessels should be cleaned every morning. All feed hoppers should be cleaned each week so that the food in them will not become moldy or sour.

If diarrhoea should be in the brood, Conkey's White Diarrhoea Remedy is a good preventive for the healthy chicks. I think it should be used in the drinking water at all times as a preventive.

EXPERIMENTS WITH COTTONSEED MEAL, HULLS AND SILAGE.

By PROF. C. A. WILSON, Animal Husbandman.

The cattle feeding industry of any country or any section of that country is governed by many conditions of climate, feed, and markets. The great cattle feeding section of this country at the present time is the so-called "corn-belt" states. In earlier years it was the practise of the farmers and ranchers in the more western of these states to graze their cattle until 2½-3 years of age and then to market them from the pasture with but little grain feeding. Within the last three decades conditions have changed. Railroads have extended to every part of the middle west, ranches have become divided into farms, and corn has been produced abundantly. Conditions have so changed that it is now most profitable to market the grain crops in the form of cattle. Where they formerly produced partly finished cattle from their cheap lands they now produce finished cattle from their high priced farms. Just as conditions have changed in the middle west from grazing cattle to finishing cattle so will the conditions change in the South, but until they do change we cannot finish cattle in the same way that they are being finished in the middle west. Systems of feeding that apply there will not apply here.

Our standard rotation of crops in the South is corn and cotton until the land fails to produce, then fallow, but in spite of the fact that we are producing as many acres of corn as cotton we are barely producing a sufficient supply of corn for the work stock and for mankind. In 1909 the South sold $59,302,000 worth of feedable crops but they also purchased for feeding purposes $59,586,099 worth of feed or they were producing a little less than

they needed for their work stock. Manifestly it is clear that we cannot finish cattle in the South until we grow more feedable crops, or at least grow more per acre. Hay and forage is the exception and not the rule in the South. But 5.7% of the improved farm area is in hay and forage while in the North 18.8% is in hay and forage and in the West 24.2%. Beef production in the South has been nearly impossible because there has been but little forage. Forage crops have had no place in our crop rotations.

The cattle feeding industry has been carried westward because of the excellent pasturage afforded there and also because there was no inducements for any other kind of farming in the West. The South has offered excellent inducements for other kinds of farming. Cotton and tobacco have given excellent returns for the money invested while on the other hand investments in cattle have not given as good returns owing to the very low prices obtained for the poorer grade of beef cattle that we have had in this section of the country.

Other factors that have held in check the cattle industry of the South have been the Texas Fever tick and the methods of farming followed. The cattle industry of the South has remained stagnant for nearly a half century owing to the many factors that have worked against it, so that at the present time the great majority of the cattle of the South are of a low grade. With the low grades of cattle that we have and the scarcity of grains that we have, it then behooves the stations of the South to plan systems of feeding that make the production of beef cattle in the South possible and profitable. We cannot follow the methods of feeding that have proven most successful in the middle west owing to differences in feed and cattle. We must, therefore, make use of such cattle and feeds as we have.

The feeds that the South has a surplus of are cottonseed meal, cottonseed hulls, and the rough feeds of the farm. At the present time we are buying such feeds as corn, barley, alfalfa hay, and bran. For the present time then the data that is most needed by the farmer is how to finish his steers on the feeds that he has on hand and how to grow stocker steers most profitably. The steers that are to be fed must be finished on the cheaper feeds that we have such an abundance of such as cottonseed meal, cottonseed hulls and silage which we can so easily obtain. The stocker steers must be fed on the cheap roughages that are so generally going to waste and small amounts of cottonseed meal. Other feeds are too high priced for cattle feeding and the class of steers that we have would not warrant the use of much grain for finishing even though it could be secured at prices prevailing in the corn belt. It is because of these reasons that the Tennessee Experiment Station has confined a large part of its experiments to the finishing of steers on cottonseed meal, hulls and silage.

During the past 5 years the Tennessee Experiment Station has had on experiment 953 head of steers, 755 of which have been fed at the

West Tennessee Experiment Station, at Jackson. These steers have been divided into 73 groups and extensive experiments made with feeds common to Tennessee and the South. In the most of these experiments the basis of the ration has been silage or hulls and cottonseed meal. The object of the majority of the experiments has been to determine the most economical proportions of cottonseed meal in the ration and also the comparative values of hulls and silage for cattle in Tennessee. In all the experiments emphasis has been given to soil fertility. During the winters of 1910-11, 1911-12, 1912-13, and 1913-14, 604 steers were fed in the open, with the result that there has been the maximum conservation of the fertilizing elements in the manure produced.

In all these experiments there has been a loss of only 2 steers, and neither of these died from the effects of cottonseed meal feeding, and as large an amount as ten pounds of the cottonseed meal per day has been fed. The meal was, however, always well mixed with the silage and the hulls at each time of feeding which may in a measure account for the low mortality.

The steers did not seem to experience any discomfort from feeding in the open and in fact the steers fed in the barn for the first two years of this series of experiments did not make more gains than did those fed the same rations in the open. In wet weather dry sleeping places were provided in each lot by putting some bedding on the dryest portions of the lot for the steers to lie on.

Enclosures were made on the poorer parts of the farm and were fenced with 4 strands of barbed wire. Each enclosure contained from ½ to ¾ of an acre according to the number of steers to be enclosed and fed. Racks and water were provided for each lot. As often as the ground was frozen the surplus manure was hauled away with the manure spreader and put on the other portions of the farm. The ground was thoroughly tramped during wet weather, but there was no ill effect owing to the fact that the manure tramped into the soil put organic matter there and made the land better than it was before. The ground was broken at once after the steers were removed.

Kinds of Rations Experimented With.

In the cottonseed meal, hull, and silage experiments, the cottonseed meal was fed in various proportions with silage or hulls, and silage and hulls, making in all 9 sets of experiments. All cottonseed meal rations were classed as low, medium, or high according to the amount of meal that was fed in the ration. The low cottonseed meal rations consisted of 3 lbs. per head per day for the first 30 days, 4 lbs. the second 30 days, and 5 lbs. the third 30 days. The medium cottonseed meal rations consisted of 5 lbs. the first 30 days, 6 lbs. the second 30 days, and 7 lbs. the third 30 days. The high cottonseed meal rations consisted of 7 lbs. the first 30 days, 8 lbs. the second 30 days, and 9 lbs. the third 30 days. Each of the cottonseed meal rations was fed with hulls, with silage, and with a com-

bination of both hulls and silage.

Gains Made.

From the standpoint of gains it was clearly shown that medium cottonseed meal rations of 5-7 lbs. per day were equally as efficient as high cottonseed meal rations of 7-9 per day. The same rate of gains was obtained and at a much less cost. Medium meal rations of 5-7 lbs. per day made better gains than low meal rations of 3-5 pounds per day. According to the Tennessee experiments, feeders are not justified in feeding cottonseed meal in as large quantities as 7-10 lbs. per day except perhaps where steers are on feed for a very short time.

The average gains per day with low meal rations was 1.52 lbs.

The average gains per day with medium meal rations was 1.75 lbs.

The average gains per day with high meal rations was 1.72 lbs.

Cost of Gains Made.

An attempt was made to get at the cost of gains with the various kinds of rations fed. We believe that not much stress should be laid on the valuation of feeds in experimental feeding owing to the variations that occur in the prices of feeding stuffs from year to year and the differences that occur each year in different localities. The chief emphasis should be placed upon the comparative gains produced and the feed required to produce them. However, for the sake of comparing costs and financial returns during the past 4 years, average market valuations were assigned to the feeds used. The following valuations were used:

Corn silage	$3.00 per ton
Cottonseed hulls	8.00 per ton
Cottonseed meal	25.00 per ton

With these valuations of the feeds used the average cost of a pound gain with the lots receiving the low cottonseed-meal ration of 3-5 lbs. per day was 8.53 cents; lots receiving a medium cottonseed-meal ration of 5-7 lbs. per day was 8.52 cents; and with lots receiving a high cottonseed-meal ration of 7-9 lbs. per day was 12.09 cents. An important fact worth noting is that with the medium and the low cottonseed meal rations the cost of the gains was but little above the market value of the gains. This puts steer feeding in the South on nearly the same basis as that of hog feeding where the gains produced pay for the feed and leave a margin for profit. With the heavier grain feeding that is practiced in the "corn-belt" from 12-14 lbs. of grain is required to put on one pound of gain which would mean if we followed such practices in the South that a pound of gain would cost from 12 to 16 cents per pound. With cottonseed meal and silage or a combination of silage and hulls steers can be fed on a much narrower margin than they can by other methods of feeding.

Effect of Varying Amounts of Cottonseed Meal With Silage vs. Cottonseed Hulls.

In these experiments varying amounts of the meal was fed with silage, with hulls, and with a combination of silage and hulls in order

LIVE STOCK BARNS, WEST TENNESSEE EXPERIMENT STATION.

to determine the maximum and minimum amounts of the meal that may with profit be fed with silage or hulls or a combination of the two. The experiments showed that when small amounts of the meal were fed such as 3-4-5 lbs. silage gave better results than did cottonseed meal, and when large amounts of the meal were fed such as 7-8-9 lbs. the hulls gave the better returns. The medium meal, however, gave better results than either the low amounts or the high amounts of the meal. When medium amounts of the meal were fed such as 4-5-6 lbs. there was not much difference in the gains with the silage as compared with the hulls. The differences with the high meal and silage and the high meal and hulls were most likely due to the fact that the steers on silage and high meal scoured more than the steers on hulls and high meal.

Silage vs. Hulls.

When cottonseed was first used in the South the most available roughage was cottonseed hulls and hence cottonseed hulls have thus come to have a commercial value. They have been so successfully fed that there has been a tendency on the part of some men to feed hulls when on their farms there has been valuable roughage in the form of corn stover and oat straw going to waste. There ought not to be the same incentive for the purchase of the hulls that there is for the purchase of the meal from the point of the amount of the fertilizing elements that they contain. Hulls have only a value of $4.15 per ton as a fertilizer while the meal has a value of $31.27 per ton. It is not uncommon to see hulls fed on the farm when the cheap rough feeds of the farm are being wasted in the fields. Instead of allowing the corn stover to waste in the fields it would be better to put it into the silo and feed it with cottonseed meal rather than purchase hulls to make up the roughage portion of the ration. Silage may be produced on the farm at a very much less cost than the purchasing price of cottonseed hulls. The results of the Tennessee experiments show that much better gains may be made through the use of silage with cottonseed meal than through the exclusive use

STEERS ON FEED, WEST TENNESSEE EXPERIMENT STATION.

of cottonseed hulls for the roughage portion of the ration. When silage is fed, however, greater gains may be made through the addition of a small amount of some dry feed such as hulls. The total average gain per head for 90 days for steers fed silage and cottonseed meal was 155 lbs.; for steers fed hulls and meal, 144 lbs.; and for steers fed a combination of silage, hulls, and meal, 172 lbs. If one consider only the medium meal rations, which were the most successful, the average gain per head per day for steers fed silage and cottonseed meal was 7.3 per cent higher than the steers fed medium meal and hulls. In the experiments where a combination of the three feeds was used the gains were 19 per cent better than where hulls and meal were used.

Cost of Gains With Silage vs. Hulls.

If we value the feeds used at $3.00 per ton for corn silage, $8.00 per ton for cottonseed hulls, and $25.00 per ton for cottonseed meal then the cost of the gains will be for the cottonseed hull rations 11 cents per pound and for the silage rations 8 cents per pound. The largest and the most economical gain was made where a small amount of hulls was fed in conjunction with the silage and at a cost of 7.6 cents per pound. If one consider only the medium meal rations the cost of a pound of gain with the cottonseed hull ration was 10.4 cents, with the silage ration lots 8.2 cents, and with the lots fed a combination of silage, hulls, and meal 7.6 cents.

These experiments seem to indicate that cottonseed hulls or their roughage equal should make up but a very small portion of the ration in steer feeding where silage can be produced on the farm. From 8-16 tons of silage can be produced on each acre of land in the South and this silage is worth more for cattle feeding purposes at $3.00 per ton than cottonseed hulls are worth at $8.00 per ton. It may be here noted that during the course of these experiments cottonseed hulls reached on the market a selling price per ton of $13.00 In these experiments silage-fed steers 7.3 per ecnt better grains and at 28 per cent less cost than did steers fed cottonseed hulls.

Farm Values of Silage and Cottonseed Hulls.

The usual method of figuring

profits in fattening steers is to charge market price for feeds on board cars at the nearest shipping station to where the steers are fed, and what is left above cost of feed and labor is declared as profit. Some feeders maintain that cattle feeding is highly profitable if but market prices for feeds can be obtained because of the increased fertility and organic matter that is retained on the farm. Indeed the maintenance of fertility has become a serious problem with many farmers. Steer feeding will pay if but market prices can be obtained for the feeds fed; and, indeed, much produce like rough hays, corn stover and the straws can be marketed through beef cattle that would otherwise return to the land without a market value. If this point of view were considered by a great many more farmers there would be many more feeding beef cattle. An attempt was made to determine a farm value for silage and also for cottonseed hulls when fed to steers that sell for 7.5 cents per pound and that are fed on a $1.50 margin. The market price paid for the cottonseed meal was charged against it and the farm value for silage or hulls determined. With this method of calculation the average price obtained for the silage fed was $7.65 per ton. There were fed 28.6 tons of cottonseed meal, which returned to the soil after passing through the steers, not less than $529 worth of fertilizing elements. The manure from the silage portion of the ration fed must have been worth not less than $354. The total value of the manure returned to the soil was then, not less than $983, and $7.65 was obtained for every ton of silage fed.

The same calculation was also made where cottonseed hulls instead of silage were fed with cottonseed meal in the ration. In the experiments with hulls a value of $13.78 per ton was obtained for each ton of hulls fed. It requires a much wider margin to feed hulls than to feed silage. The average profit per steer fed hulls was $7.28 when hulls cost $8.00 per ton, while the profit per steer fed silage, when the purchase price of silage is $3.00 per ton, was $11.28.

The feeder should bear in mind the fact that silage may be produced on the farm at a cost not to exceed $2.00 per ton while hulls often sell at a price nearly equal to that obtained for them in these experiments. Once during the progress of these experiments they reached the selling price if $13.00 per ton. It should be borne in mind that these values have been established on a definite margin of $1.50 between the purchasing and selling price of the steers fed. Had a margin of only $1.00 been allowed in the calculation of this data, then but $9.57 per ton would have been obtained for each ton of hulls fed.

From these experiments we may conclude that steer feeding offers large returns for the corn crop when it is fed in the form of silage, and that the risk is much less in steer feeding when silage is fed than when hulls are fed. On the average one is entirely safe in figuring on $1.50 margin in steer feeding which will give a very profitable return for silage fed to steers. It is safe

to say that on the average farmers may obtain an average of from 8-10 tons of silage per acre which if fed to steers would give a gross return per acre of $61.00 to $76.00 per acre. Silage and medium rations of cottonseed meal offer large opportunities for the Southern farmer.

Influence of Type and Breeding Upon Gains.

In all of the experiments at the West Tennessee Experiment Station an attempt has been made to determine as far as possible the influence of type and breeding upon the gains made. In the earlier years of these experiments there was an excellent opportunity for this study owing to the fact that there was a wide variation in the conformation and the breeding of the steers on the experiments. In the beginning of each experiment the steers were divided into groups as nearly equal in type and quality as possible. During the autumns of 1910 and 1911, after division into groups, each steer was described in the experimental notes according to color, breed characteristics, and feeder type. If a steer appeared to have one or more crosses of some pure breed, it was described as belonging to that breed. At the close of the experiments the gains for the steers belonging to the beef breeds were totaled, as were also the gains of the steers belonging to the dairy breeds and scrubs. Data were obtained on 196 head of steers. In the year 1910 steers that were the result of one or more crosses of a beef breed made 39 lbs. more gain than steers in which dairy blood predominated; beef bred steers made 41 pounds more gain than scrub steers. Dairy bred steers and scrub steers made practically the same gains. There were no steers in 1911 that showed dairy breeding. Beef-bred steers in 1911 made, under the same conditions, 10 lbs. more gain than scrub steers. The average for the two years showed a gain of 26 lbs. in favor of the steers with one or more beef-breed crosses. Not only did the better-bred steers make more gains, but the gains were put on in the more valuable beef cuts, and thus made the beef-bred steers sell at a wider margin and thus made greater profits.

Each steer was also described according to the feeder type, regardless of breed characteristics. The following classification of the feeder types was made, viz.: poor, medium, good, and very good. These classifications were made according as a steer possessed heavy quarters, a broad back, depth in heart girth and digestive capacity, and had good quality as indicated by a pliable shin and soft coat of hair. In this classification breed characteristics were ignored as far as possible. That this was done may be shown by the fact that 4 scrubs in 1910 were classified as "very good." Scrubs so classified, however, made lower gains than beef breeds of the same classification.

In 1910 steers that were of "very good" beef type made 25 lbs. more gain than steers of "poor type" and 41 lbs. more gain than steers of medium type. In 1911 steers of "very good" beef type made 44 lbs. more gain than steers of "poor" type. The average gain for 24 steers

of the best type for the 2 years was 34 lbs. higher than the average gain of 37 steers of the poorest type. Twenty-four steers of the best type made as much gain as 32 steers of the poorest type. In other words it took 8 more steers of the poorest type to make the gain that was made by the steers of the best type.

This series of experiments has shown,

First.—That it is possible to feed steers in the South without the use of corn and yet give the steers a fair amount of finish..

Second.—That medium cottonseed meal rations of 5 lbs. for the first 30 days of the feeding period, 6 lbs. for the second 30 days, and 7 lbs. for the third 30 days produce more gain than either lower or higher amount of the meal.

Third.—That medium amounts of the cottonseed meal and silage or silage and a little hulls make the most profitable gains.

Fourth.—That steers can be fed on a much narrower margin where silage makes up the principal portion of the roughage ration than where cottonseed hulls make up the roughage ration.

Fifth.—That breed characteristics have a marked influence upon the amount of gains made.

Sixth.—That conformation or type has an influence upon the amount of the gains made.

CULTURE AND EFFICIENCY.

By W. J. FORBESS, Special.

For a few years the slogan of our schools has been for "Efficiency," and we can not say that it is not a good one; but we must say that the world needs cultured as well as efficient men and women as never before. If we think of efficiency as being prepared to make money, we are confining the term to a restricted meaning; for to earn money is a very small part of the duty of man.

Let us consider for a few moments the meaning of the term "Education." One has said that "Education is preparation for complete living," and another that it is life itself. Either definition includes both culture and efficiency. To be prepared for complete living is to be cultured and efficient. The more culture and efficiency an individual has the more life he possesses. Christ the great teacher came and taught man, that the race might have life and that they might have it more abundant. We know that the plant which receives proper culture is the one most efficient. Man does not appreciate such a plant merely for what it produces. He enjoys its beauty and perfection. As with the plant so with an individual.

Man should be prepared to make money, to use it judiciously, to serve self, to render assistance to others and to stand for everything that pertains to the welfare and happiness of the human race. And this must be accomplished through the influence of culture, efficiency and the spirit of brotherly love. One should be cultured not merely for his own sake but for the more efficient service he may render humanity. We may say with another that "The first problem of learning is to make men intellect-

ually efficient." The intellect possesses latent energy and this must be aroused and developed so the individual may discover himself and realize his possibilities. Men must learn to think for themselves and be able to discriminate between essentials and non-essentials, and to prove what is of real value. It is not enough to have men's minds stocked with mere facts; they must be able to reason soundly and constructively. The educated man is a student, for to be educated is to be prepared for and to have a desire for further knowledge. He is equipped with material for the accomplishment of his possibilities.

Another task of education is to relate culture to life. One has said that "Culture certainly makes for efficiency but efficiency does not necessarily make for culture." "It is educated sympathy." In whatever line of work we are placed, we must remember first of all that we are human beings and if we "miss culture we miss the prime element in education." Learning brings a great satisfaction to life but beyond this there are nobler ends of life which it may serve. Our institutions in our educational system are doing an inestimable service when they turn out men and women who have cultured minds, trained hands, observing eyes and listening ears: in short cultured observers in the world of science, art and literature. But beyond this there is a more serious purpose. "It must serve all the intelligent ends of living." "There must be a union of learning with the fine art of living." Life must be made safer, healthier, happier, more prosperous and satisfying. Higher education has been criticised because it failed to relate itself to the practical uses of life. Our school system from the kindergarten to the University is educating the race for something. The decorative value of knowledge is a small part. Beyond it, is its serviceableness when translated into life. We must not look on culture for its sake alone, but for its value in giving greater influence for good. We should be cultured to relate our learning to life. Men must be trained to build highways, operate mines, construct bridges, farm intelligently and to labor in other various fields of activity. Yet there is danger of learning devoting itself chiefly to the "material side of life." When knowledge is materialistic it is not truly efficient. It must be such that it fits man for intelligent purposeful living. Society needs skillful workers who are cultured and who can get men to do things that are of vital interest to the great mass of people. Men need to be made to think and to act. Emerson's prophecy must be fulfilled, "The sluggard intellect of this continent will look from under its iron lids and fulfill the post-paved expectation of the world with something better than the exertion of mechanical skill." Men who deepen our quality of living are the men who are arousing this sluggard intellect.

Another task of education is to dominate culture with moral earnestness and a spiritual passion for service. Our natural resources are being rapidly developed, wealth is accumulating, and great opportunities are awaiting us. This tends to increase luxury, and the ambition to acquire property and an inclination to seek satisfaction in material things. Culture must hold up to the most intelli-

gent uses of wealth and power, so our scheme of education will make men care for learning, for integrity and public virtue. "Culture not for its own sake, character not for its own sake," but both culture and character, for the sake of humanity, should be raised to the highest point of educated human sympathy.

NEWS.

Mr. Herbert R. Watts, of Ohio State University, Class 1910, has been appointed assistant entomologist of the Tennessee Agricultural Experiment Station and the state board of entomology.

Mr. E. C. Crockett, who has had three years' work in the Agricultural College at Starkville, Miss., is assisting Prof. Bentley in insect life history work.

Tennessee University's fellow assistant in animal husbandry who was Mr. D. T. Hardin left Knoxville for Chattanooga on April 24, where he will immediately take up his work as Hamilton County demonstration agent.

A recent investigation by Tennessee state authorities shows that the fruit crop of West Tennessee was very badly injured by the cold weather on April 8-9. In Middle and East Tennessee the damage was not so great as in West Tennessee, yet about 10-20% of the fruit in Middle and East Tennessee was killed. The cold weather of this same time also killed about 40% of the strawberry crop.

The Agricultural institute held at Good Springs, Tenn. (near Etowah) on April 18-19 was largely attended and much interest shown. There were present, from the University of Tennessee, Prof. Morgan, Prof. Bentley, Mr. O. M. Watson and Mr. T. L. Robinson, and from state department of Agriculture, Messrs. T. F. Peck, Commissioner of Agriculture, A. L. Garrison, fuel and seed inspector, J. S. Ward, bee inspector. Many interesting and valuable talks were given, most important of which were by Mr. Ward on "Bee Keeping," Prof. Bentley on "Economic Insects of the Farm," Prof. Morgan on "Crop Rotation" and "The Rural Credit System," and Mr. A. L. Garrison on "Testing of Seed."

The Big U. T. Circus will take place on Waitfield, May 2. From the preparations being made and from the general interest manifested it promises to be the most successful yet held. The Agriculture Club and all other organizations on the hill are preparing stunts, and constructing monstrocities for the parade. Several prizes are offered for the best stunts and best animals.

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EDITORIAL.

This issue marks the close of the old year and the beginning of a new for the U. T. Farmer. The past has been one of pronounced success due largely to the untiring efforts of the outgoing editor and business manager.

The new administration has many plans and ambitions. Its chief aim, however, will be to maintain and perpetuate the high standards of the past, and at the same time to make any possible improvements.

As we take up the work of this new year we realize that possibilities both for progress and mistakes lie before us. We wish to make the best of our opportunities and solicit the helpful co-operation of our readers to this end. We can promise nothing more than our best and ask no less of you.

THE TREND OF THE TIME.

Life is being put on a more certain basis. To-day we rely on definite realities. We are coming to believe that there is no such thing as accidents in the course of events; that luck is not the secret of success, but that every effect has its cause and every cause its effect. The matter of chance is becoming less and less a controlling factor in destinies. Farming is no longer a matter of chance. Scientific methods are being employed to such an extent that we are able to control many of our most harmful and destructive enemies, and to a certain degree predict future results. If the land is too dry we irrigate, if too wet we drain. If thin, we treat with fertilizers and rotate our crops. If harmful insects interfere we spray. It would seem that every precaution is being taken to give a maximum production and a minimum loss. But this is not all there is to successful farming. Successful farming does not begin and end with production. If this were true we would have fewer failures on the farm. We are not ready to rest on our oars and drift with the tide as if the last precaution had been taken and the final difficulty surmounted.

The big problems in the industry of Agriculture are yet to be solved.

During the last half century, and particularly the last decade, there has been a great movement in the direction of education in Agriculture. In the last issue of this magazine attention was called to the fact that 2000 public high schools are teaching agriculture, whereas sixteen years ago not one offered such instruction. Again, that in 1909 less than 350 institutions taught agriculture, whereas to-day about 2,600 teach it. But most of this instruction has been one-sided; it has only covered one-third of the activities of the modern farmer. It has taught him to produce, but failed to teach him anything about marketing his products and investing the money received. Our systematic study of agriculture began with a study of production. Experiment stations were established to find out, and colleges to teach soil physics and chemistry, animal and seed breeding, diseases of fruits, grains, and vegetables, and diseases in the animal kingdom, ways "to make two blades of grass grow where one grew before and two drops of milk flow where one flew before." All this was necessary at the beginning and is important to-day. To say that the farmer must study the problems of buying and selling, that he must be a business man, does not mean that he is to be any less a producer. The application of business methods to buying and selling does not imply a neglect of the fundamental principles of farm operations and management such as the rotation of crops, fertilizers, breeds of seed, rate and date of seeding, time and most economical methods of harvesting. But in an age of commercial agriculture it is as important to buy and sell well as it is to produce well.

To accomplish this end farmers must organize themselves into co-operative buying and selling associations. Other business men do, why not farmers? Combinations in all kinds of business exist to-day, and capital is concentrated about gigantic enterprises. But not so in agriculture; instead the money of the country has accumulated in the towns and cities.

We do not wish to leave the impression that nothing has been done toward this end. There are many successful organizations both in this country and Europe all of which give evidence that the proposition is no longer in the experimental stage. In Ireland alone there are one thousand agricultural organizations in successful operation. Denmark has been discovered through similar institutions. Agricultural organizations have had a phenomenal growth in this country, particularly during the last twenty years. Probably the most successful organizations are those among fruit growers and truckers. We do not have time to discuss any of these in detail. The advantages of such institutions are too evident to be overlooked. The splendid shipping facilities, good markets, etc., could never have been had without such co-operation. In co-operation there is strength. As we labor for greater yields let us unite for better buying and selling facilities. Yes, unite

without apology, because we believe that farming should be put forward in the land, and that the laborer should get full reward for his toil.

This issue wishes to call the attention of the reader to the general program of the forty-first annual session of the East Tennessee Farmers' Convention, which convenes at Temple pavilion, a home constructed for its peculiar needs, May 19, 20, 21.

The discussions will be devoted to practical subjects, up-to-date and opportune. Among the topics discussed are rural credits, co-operation, the silo and its use, profitable live stock rations, fertilizers, the dairy cow and home-grown feeds, the garden, Irish potato culture, corn club work, girls' tomato clubs, business organizations for farmers, and various other related and equally important subjects. Pruning demonstrations of the grape, cherry, peach, quince and apple will be given under the able supervision of Professor Keffer. The discussion on rural credits will be lead by Congressman Ralph W. Moss, of Indiana, who was a member of the U. S. commission for the study of this subject in Europe.

With such a variety of subjects as will be discussed every farmer of East Tennessee should arrange to attend at least one day's meetings, and the entire session if possible.

GENERAL PROGRAM OF EAST TENNESSEE FARMERS' CONVENTION.

GENERAL PROGRAM—TEMPLE HALL.
FIRST DAY, TUESDAY, MAY 19th.
Morning Session.

10:30—Call to order by the president, W. B. Stokely, Dandridge. Devotional exercises. Federation of churches of Knoxville.

10:45—Introductory remarks by the president.

11:15—Community organization, Hon. T. F. Peck, commissioner of agriculture, Nashville.

12:00—Appointment of committees. Announcements.

Afternoon Session.

1:00—Highway Legislation for Tennessee. Cyrus Kehr, Knoxville.

1:30—Address, G. A. Park Gen. Im. & Indl. agent, L. & N. R. R., Louisville, Ky.

2:30—The Railroads and the Farmer, Robert Cates, immigration agent, L. & N. R. R. for Tennessee, Nashville.

3:00—Feed, Seed and Fertilizer Laws. A. L. Garrison, chief seed and feed inspector, Nashville.

3:45—Demonstration of Girls' Tomato clubs, directed by Miss Margaret Ambrose, Knoxville.

4:30—Visit to the experiment station farm.

Evening Session.

Business organization of farmers.

7:00—(a) Farmer's Insurance companies, John A. Jones, Knoxville.

7:20—(b) Rural Credit associations, W. J. Shuford, Hickory, N. C.

7:50—(c) Buying and Selling associations, L. M. Rhodes, president State Farmers' union, Huntingdon.

8:20—Address, T. N. Carver, director rural organization service, U. S. department of agriculture, Washington, D. C.

SECOND DAY, WEDNESDAY, MAY 20th.

Morning Session.
(Sectional Meetings.)

Afternoon Session.

1:45—Rural Credits for American Farmers. Congressman Ralph W. Moss of Indiana, member U. S. commission for the study of rural credits in Europe.

2:45—Address, Miss Mary Creswell, U. S. department of agriculture, Washington, D. C.

3:30—The Torrens system of Land Title. (To be supplied.)

Evening Session.

1:00—Conference on the Education of the Tennessee Farmer, His Wife, His Boy and His Girl. Discussion led by Prof. S. H. Thompson, state superintendent of public instruction, Nashville, Tenn.; and Prof. Wm. R. Bourne, state high school inspector, Nashville.

THIRD DAY, THURSDAY, MAY 21st.

Morning Session.
(Sectional Meetings.)

11:00—Reports of committees. Election of officers. Miscellaneous business.

1:00—Adjournment.

GENERAL FARM AND LIVE STOCK SECTION, TEMPLE HALL.

First Day, Tuesday, May 19.—(See general program.)

SECOND DAY, WEDNESDAY, MAY 20th.
Morning Session.

8:30—Efficiency of the Dairy Farm as Related to Crops and General Farm Management. Prof. W. J. Fraser, University of Illinois, Urbana, Ill.
9:30—The State's Fight Against Hog Cholera. Dr. George R. White, state veterinarian, Nashville.
10:15—Discussion of the following live stock topics by members of the convention.
The Mare for Work and for Mules.
Pastures and Grain Crops for Hogs.
Land Production in East Tennessee.
Silage for Winter and Summer Feeding of Beef Cattle.
The Silo: Kinds and Use.
Insufficiency of Our Pastures and Meadows.

Afternoon and Evening Sessions—(See general program.)

THIRD DAY, THURSDAY, MAY 21st.
Morning Session.

8:30—Farm Poultry: Suggestions, Advice and Profits. J. A. Dinwiddie, assistant commissioner of agriculture for East Tennessee, New Market.
9:00—Discussion of the following live stock topics by members of the convention.
Profitable Live Stock Rotation.
Beef Cattle versus Dual-purpose Dairy Cattle for the farm.
Fertilizers to be Used in Supplementing Farmyard Manure.
Balancing of Live Stock Rations by Farm Grown Feeds.
How Can We Increase our Acres in Alfalfa.
Community Breeding and Raising of Live Stock.

DAIRY SECTION, IMPLEMENT BUILDING.

First Day, Thursday, May 19—(See general program.)

SECOND DAY, WEDNESDAY, MAY 20th.
Morning Session.

8:30—The Dairy Cow and Home Grown Feeds. Dr. C. M. Morgan, dairy agent, Southern Railway, Atlanta, Ga.
9:45—Types of Silo:
(a) The East Tennessee Wooden Silo. J. W. McGhee, Cleveland.
(b) The Stave Silo. D. F. Bolton, Limestone; Reed Manly, Jefferson City.
(c) The Concrete Silo. J. B. Carter, Bulls Gap; J. R. Sanders, Persia.

Afternoon and Evening Sessions—(See general program).

THIRD DAY, THURSDAY, MAY 21st.
Morning Session.

8:30—Business Principles Applied to the Dairy Farm. J. H. McClain, U. S. department of agriculture, Washington, D. C.
9:15—Efficiency of the Dairy Farm as Related to the Herd. Prof. W. J. Fraser, University of Illinois, Urbana, Ill.
10:00—Benefits of Herd Records (10 minute talks), Lee Frizell, Maryville; Reed Manley, Jefferson City; D. F. Bolton, Limestone; F. E. Russell, Calhoun; D. D. Collins, Sweetwater; D. C. Young, Sweetwater.

HORTICULTURAL SECTION.

First Day, Tuesday May 19—(See general program.)

SECOND DAY, WEDNESDAY, MAY 20th.
Morning Session.
(At University fruit farm.)

9:00—Pruning demonstration of grape, peach, cherry, quince, apple. Prof. C. A. Keffer, University of Tennessee, Knoxville.
Spraying demonstration with barrel, lever, compressed air and gasoline power pumps. Prof. G. M. Bentley, state entomologist, Knoxville.

Afternoon and Evening Session—(See general program).

THIRD DAY, THURSDAY, MAY 21st.
Morning Session.
(At seed barn, experiment station farm.)

9:00—The Farm Garden. R. C. Briggs, Agricultural experiment station-Knoxville.
Irish Potato Culture. A. G. Naugher, Knoxville; B. R. Sartain, Knoxville.
Crops for Commercial Canneries. W. T. Moore, Cleveland.
Culture and Marketing of Asparagus. Horace Rainey, Columbia.
Fertilizers for Truck Crops. R. T. BeDerry, assistant commissioner of agriculture, Humboldt.

HOME-MAKERS' SECTION. TENNESSEE HALL.

First Day, Thursday, May 19—Morning and evening sessions (see general program).

Afternoon Session.

(In dairy section room at experiment station farm).
2:00—Business session.

SECOND DAY, WEDNESDAY, MAY 20th.
Morning Session.
THE FARM HOME:

9:00—Report on Model Farm Home. Miss M. E. Frayser, Winthrop Normal, Rock Hill, S. C.
Discussion.
10:00—The Organization of the Farm Home for Health. Dr. Olin West, state board of health, Nashville.
11:00—Demonstration of bread and biscuit making. Mrs. Elizabeth Lauderback, Chattanooga.

Afternoon Session.
THE FARM COMMUNITY.

1:00—An East Tennessee Venture in Rural Education. Miss Mamie Sloan, Cleveland.
Discussion led by Mrs. E. J. Wilbon, Calhoun.
2:00—Discussion of community organization by members, led by Mrs. F. H. Franklin, Riverdale, and Mrs. Clara Boone Mason, Prospect.
Our Canning Club, Miss Mary Duncan, Tasso.
How I Handle My Tenth Acre. Miss Jessie Eldridge, Sale Creek.
4:00—The Social Side of Farm Life. Miss Virginia P. Moore, state organizer, Nashville.

Third Day, Thursday, May 21—(See general program).

BOYS' CORN CLUB SECTION.

In charge of J. R. Fewell, state corn club agent. Second floor of barn No. 1.

First Day, Tuesday, May 19—Morning session—(See general program).

Afternoon Session.

1:00—How to Get the Most Benefit from the Convention and Institute. Hon. T. F. Peck, commissioner of agriculture, Nashville.

The Corn Club Work. Prof. I. W. Hill, U. S. department of agriculture, Washington, D. C.

The Cultivation of Corn. C. F. Striplin, Maryville.

Evening Session—(See general program).

SECOND DAY, WEDNESDAY, MAY 20th.

Morning Session.

8:30—The Demand for Seed Corn. H. D. Tate, Nashville.

How I Grow My Acre of Corn. Clyde Dinwiddie, New Market.

Selection of Seed Corn. Prof. J. C. Pridmore, University of Tennessee, Knoxville.

Afternoon and Evening Sessions—(See general program).

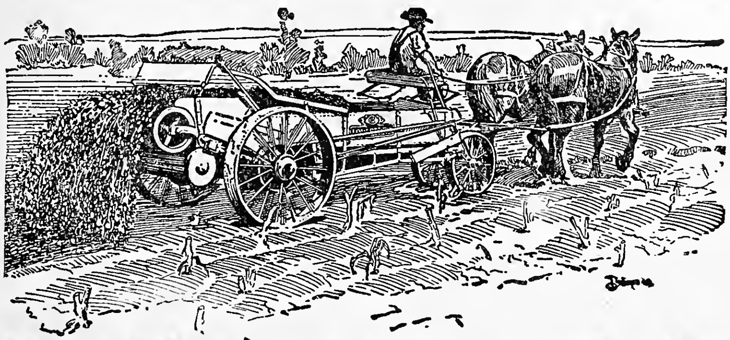
THIRD DAY, THURSDAY, MAY 21st.

Morning Session.

9:00—How I Won the Trip to Washington. Clarence Nave, Elizabethton.

Pig Raising for Corn Club Boys. Prof. C. A. Wilson, University of Tennessee, Knoxville.

Poultry Raising for Corn Club Boys. J. A. Dinwiddie, New Market.



THE
U. T. FARMER

Part of Machinery Exhibit at Farmers' Convention

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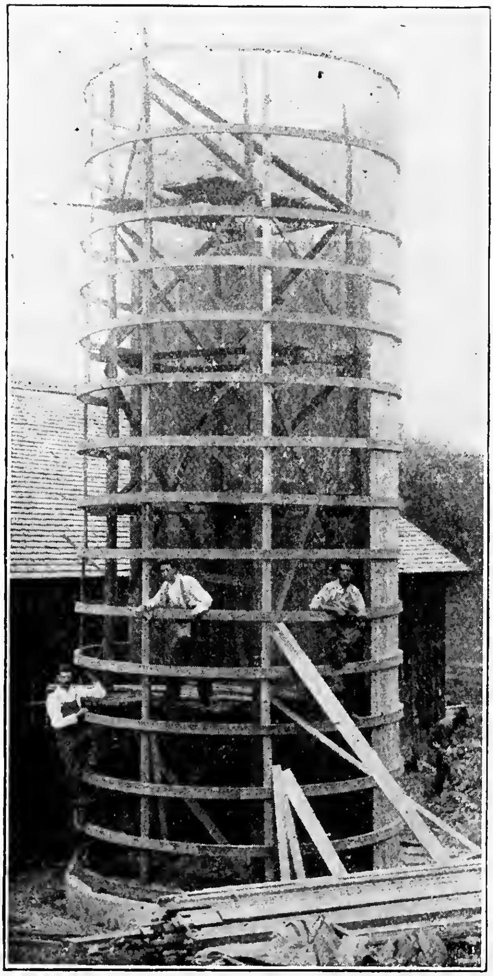
Contents



Silo in Course of Construction

THE U. T. FARMER

Vol. 8. JUNE, 1914. No. 9

THE WOODEN-HOOP SILO.

By C. M. HUME, '14.

The depletion of Tennessee soils and the rapid increase of land values is slowly bringing our farmers to realize the opportunities, which are theirs in dairying and meat production.

If our soils are to become more fertile and meet the demands, which an increased population will place upon them, we must keep more stock per farm and produce them more economically. To meet these changing conditions farmers over the State must be ready to seize any idea whereby soil fertility may be increased and cost of production lowered. It is for this reason that silos are coming more and more in favor in Tennessee.

The first question every individual should ask is, what kind of a silo shall I build? To answer this question intelligently the individual condition must be known. One must be governed, not by his neighbors, but by his own circumstances.

As a general rule patented steel or wooden silos are priced above their real value. They do possess the advantage of ease of construction and therefore, require less skill on the part of the man erecting them, than does any other type.

Concrete silos are more difficult to build and unless well constructed throughout are failures. Where the bulk of the material for such a silo is near at hand and the builder is a man of some initiative, the concrete silo may be erected at moderate cost. In such cases they are satisfactory in every respect and the most durable silo one may build.

The wooden-shoop silo is becoming very popular on account of its cheapness and in the majority of cases it is no doubt the best silo for Tennessee farmers. For this reason the following method for erecting this silo is given, not to be followed literally, but as a mere outline to be modified by the builder as conditions may demand.

In choosing the site for the silo select the place, which is handiest to the feeding alley and gives the best drainage. If the silo is to be located in the open for steer feeding it should be put upon the highest ground.

One must next decide upon the size of the silo. The best grade of silage is secured, when it is of sufficient depth to pack well. The height should be at least twice the diameter and better results are secured if it is not under 30-32 feet tall. To prevent molding 1½-2 in. of silage must be removed per day. Knowing the number of cattle fed the diameter of the silo is readily derived from the following table taken from Va. Bul. 132, which shows the ratio between the number of animals fed and the diameter of the silo:

No. of Cows	Diam. of Silo in Feet
7-10	8
11-16	10
17-23	12
24-30	14
31-40	16
41-50	18
51-60	20
61-70	22

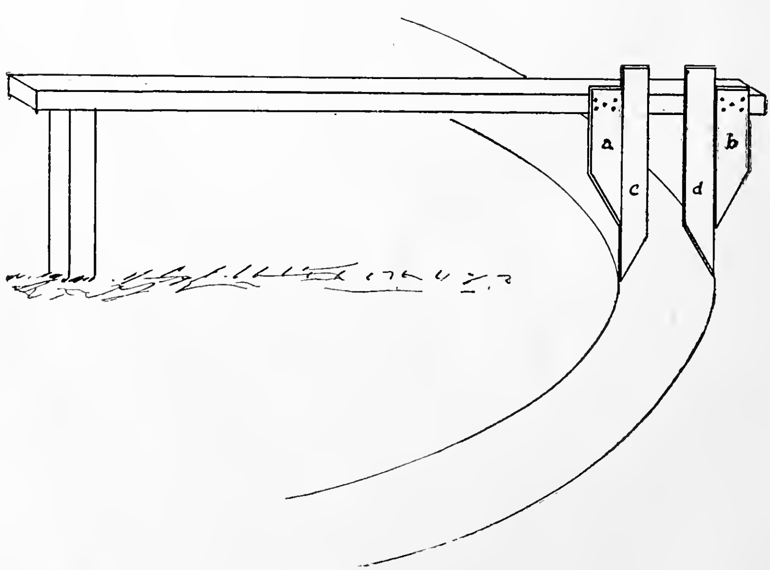
It is doubtful economy to build a silo larger than 22 feet in diameter, as the extra cost of filling and also of removing the silage will often offset any advantage to be gained by the large size.

The height of the silo may be readily obtained after deciding the diameter by multiplying the number of days in the feeding period by the depth in inches which must be removed each day.

Having decided the location and size of the silo, the next important consideration is that of the foundation. This question deserves more thought than is usually given it. One must remember that it is often poor economy to sacrifice durability in order to make a small saving.

The foundation must be put deep enough to be upon solid ground and below the frost line. If good, hard dirt is struck 1-2 ft. is sufficiently deep to put the foundation wall. It should extend 1-2 ft. above ground, to prevent the rotting of the staves. The wall should be 6-8 inches thick and re-enforced by means of a cable made of several strands of wire, embedded in the concrete.

To lay out the foundation, first drive a piece of 2x4 into the ground at the exact center of the proposed site. The top of this stake should be at the exact height of the foundation wall. To this nail, with a large spike, a good straight 2x4. Beginning at the spike, which is the exact center of the silo, measure on the 2x4 the radius of the silo. At this point tack a marker. At a point 8 inches farther out tack another marker. By



Method of Laying Out the Foundation

turning the 2x4 the location of the wall is marked upon the ground. The dirt is next taken from between the two lines. If possible a tile drain should now be placed in the bottom of the silo to carry off excess water and keep the foundation firm. The trench is now filled with the foundation material composed of 1 part cement, 3 parts sand and 5 parts gravel. If the soil is firm the dirt within the circle may be taken out to a depth of 3-4 feet, the soil below the foundation being used as the retaining wall. It is not absolutely necessary that a concrete floor be made, but it is better to lay one from 3-4 inches thick. The advantages of a concrete floor are obvious. Diagram A, shows the method of laying out a foundation. When the foundation is built to the surface of the ground, drive 2x4 stakes ½ in. from the inner wall of the foundation and 2 feet apart. By means of a straight-edge mark on these stakes the height of the wall. Nail ½x4 in. to the outside of these stakes which will later be used as hoop material. The top strip should be put exactly on the mark ujst made, as they represent the top of the foundation wall. In a similar manner make the outside wall of the form. Nail a few slats across the top of these forms to hold them in place. Fill the for mwith the 1-3-5 mixture, care being taken that the stone are kept away from the wall. This is necessary in order to have smooth surfaces.

In selecting material for the staves be sure it is good, straight 1x4 material, free from sap wood and loose knots, dressed and tongued and grooved if possible. Preferably it should be long-leaf yellow pine. Here, again, we must be governed by local conditions. In some instances oak has been used, but it is not to be recommended if more durable lumber can be procured. If possible the staves should be of one length, but where this is out of the question, as it is in most cases, the two pieces should be of different lengths and alternated when set up. This is to break points and overcome the weakness caused by the two-pieced staves.

A very good material for the hoops can be made from the butt cuts of green white oak, sawed in strips ½x3 in or ½x4 in.

Before starting to erect the silo several hoops should be made on a form similar to the one in Dia. B. The hoops are made 4-ply thick, care being taken to break joints if possible.

These hoops are laid upon the foundation wall, a scaffolding made of poles or scantlings is next put up, which is used as a support for the hoops as well as a convenience in placing and nailing the hoops and staves. One hoop should be put on the foundation, two at the points where the staves break joints and one near the top of the silo. As stated before, these are held in place by the scaffolding.

Begin placing the staves at one side of point where the doors are to be and be sure that the first one is plumb. Drive each stave in place and nail securely to the hoops. Continue this around the silo, leaving about 2 feet space for the door. The second length of staves is put up in the same manner.

The remaining hoops are next put on, as they are more easily made by

tacking the strips to the silo than upon the form previously used. Nail each stave to these hoops, which should be 18 inches apart near the ground and 2½ feet near the top.

Although not an absolute necessity in this climate, a roof will add much to the appearance and life of the silo, as well as making it more agreeable for the feeder, during stormy weather. A roof may be made of shingles or metal roofing as desired.

Doors may be made of pieces of the staving, laid crosswise, a strip should be nailed about 1½ inches on either side of the door opening, to hold these pieces in place.

In this style of silo the hoops will serve as a ladder, but a shute should be built enclosing the doors. The form of this chute will vary with the location of the silo and may easily be worked out to suit individual needs.

The silo should be given a good coat of paint on the outside. The inner surface should be painted each year with creosote.

The silo should be anchored securely by means of guy wires from the upper part of silo to rods embedded in the ground several feet from the base.

A silo of this type, if well constructed, will last for years and should be erected at a cost not to exceed $1.35 per F. capacity.

STUDENTS' PLOT WORK IN VEGETABLE GARDENING.

By GUY YOUNGERMAN, '15.

The object of this article is to give you an idea of the methods of vegetable gardening pursued by the students at the University Farm and the results obtained.

The land set aside for this purpose is of two types although it is in the same plot. About half of it is a clay loam while the other is a heavy type of shale. The latter has been, for several years, fertilized with from 30 to 40 tons of barnyard manure. The other part has received no application of barnyard manure but has been sown to some cover crop which is turned under in the spring. The land was ploughed deep and well cultivated before time for beginning the vegetable crops.

By way of suggestion, this type of soil is not so desirable for truckers and market gardeners as some others, particularly the sandy loam. The sandy loam type is regarded as the best because it can be cultivated earlier in the spring. Then, also, being loose and porus it warms up much more rapidly, thereby enabling the seed to germinate more quickly than it would do in the heavier types. Also plants, because of the warm nature of the soil, grow off more rapidly.

But to return to the system of gardening followed by the students, the entire plot is divided into small plots of 10x20 feet and each student is assigned one of these whereon he is to plant various kinds of vegetables,

cultivate them and observe their growth.

The preparation of the seed bed should be very careful and thorough, for poor germination can be to some extent attributed to a poorly prepared seed bed. A very intensive system of planting and inter-cropping was devised by Professor Keffer and each student was to follow this plan closely. Each plot was to be planted in rows 10 feet in length and 9 inches apart, thereby permitting only hoe culture. Planting was to be uniform in depth, and the soil well firmed over the seed. The object of this was to secure an even stand of plants. An outline of the plan as seen below may be of some value:

Row No. 1—onions.

Row No. 2—spinach (2) egg plants and peppers.

Row No. 3—spinach (2) beans.

Row No. 4—spinach.

Row No. 5—radishes (2) squash.

Row No. 6—peas.

Row No. 7—peas.

Row No. 8—peas.

Row No. 9—radishes.

Row No. 10—lettuce.

Row No. 11—lettuce and radish.

Row No. 12—cabbage (transplanted from hotbed).

Row No. 13—lettuce and radish.

Row No. 14—radish (2) cauliflower transplanted (3) cucumber.

Row No. 15—mustard.

Row No. 16—beet.

Row No. 17—lettuce (transplanted) (2) tomato (transplanted).

Row No. 19—beet.

Row No. 20—beet.

Row No. 21—carrot.

Row No. 22—mustard.

Row No. 23—carrot.

Row No. 24—radish.

Row No. 25—carrot.

Row No. 26—beans.

A study of the outline will show that the quick crops or as they are better known as forcing crops are interspersed between the other vegetables. These are usually ready to take off before the slower crops become injured by them. Chief among the forcing vegetables are spinach, radishes, mustard, and lettuce. The radishes and lettuce make an excellent companion crop, the radishes being removed before the lettuce is injured by them. Likewise tomatoes and cauliflower may be transplanted from the hotbed or green-house to a row of radishes or spinach without harming that crop in the least. It is by the growing of companion crops and intensive methods of planting that some market gardeners are able to outstrip their competitors in returns. On a recent investigating trip we found many different methods of market gardening being followed. One gardener said he realized over $600 per acre from his little farm. He removed at least three and sometimes four crops during the season in connection with sowing his land each fall to some cover crop. One system was to plant onions and then broadcast mustard and radishes over them. When these were removed he could use his land for carrots.

The use of commercial fertilizers is essential unless the soil is especially rich in humus, and then its cost is more than compensated for by the returns. It is especially desirable for the "quick" crops and for cabbage and cauliflower. In our experiment at the farm we took half of each plot

across the rows and on it put two applications of nitrate of soda at the rate of 100 lbs. per acre at intervals of about twenty days, the first application being made after the garden had been worked the first time. The effect of it was first seen on the cabbage and cauliflower. A month after the first application most of those plants around which nitrate of soda had been placed were from one to two times as large as those which had not received the application. The yield from the plants of the spinach row around which the nitrate had been placed was almost double the yield received from the part that had received no application. The results produced on the radishes were very interesting. Those that received an application of nitrate of soda were very much larger and were more uniform in size than those which did not. The effect of it on all the other vegetables was plain but not so marked as on those mentioned.

Cultivation was begun as soon as the plants were up and in some instances even sooner. In the case of beets and carrots, a slight stirring of the soil about the time the tender shoots are breaking the crust of the ground will enable many of them to come through that otherwise would have perished. Cultivation should be as often as possible, and in dry weather it should never be neglected. The object of all tillage is to conserve the moisture conditions for the growing crop and not to fight weeds as many suppose. The ground should be carefully mulched (and not merely scratched over which is just a little better than no tillage at all.) The roots of most garden and truck crops feed very shallow and tillage should be so conducted as not to injure the feeding rootlets. Some crops do well with little workings but most require tillage until they reach maturity.

THE TOBACCO HORN-WORM IN TENNESSEE.

By R. L. TAYLOR, Special.

Tobacco insects cause a loss to the United States yearly of not less than \$5,000,000.00. Tennessee bears a goodly portion of this burden. Several insects do serious damage locally almost every year, but the pest that causes the worst yearly damage is the tobacco horn-worm, or "Tobacco Fly" as it is commonly called throughout the State. The tobacco horn-worm, as this is the general name, will be found over a greater area than any other insect infesting the tobacco plant. In Tennessee this pest is especially bad and unless combatted continually, does serious damage. There are two species found in the United States; one in the North, while the other infests every tobacco field of the South. It is the latter species that we wish to discuss here, since it is the one affecting us (Tennessee) most materially.

Considerable study and investigation has been made concerning the horn-worm, and its life history is well known to most tobacco growers

in our State. It requires from forty-five to forty-eight days for the Southern tobacco worm to complete its life cycle. From two to three generations are produced each year. It passes the winter season in an oval shaped pupa about four inches under the surface of the earth, remaining there until the following May or June when it emerges in the form of a moth. Only a few days elapse before the female begins to lay her eggs and just a few days longer the young larvae begin their ravenous attack upon the young foliage of the plants.

Before tobacco was raised so extensively, hand picking of the larvae was resorted to. Now the pest cannot be dealt with in that manner with any degree of efficiency; therefore we must employ more effective methods of control. A. C. Morgan, Field Agent, Bureau of Entomology, making careful observations on this insect has found that not more than twenty-five per cent of the hibernating stage pass the winter season successfully, and has also reported that cold winters do more to keep this pest in check than any other agent. Since this is true a great number may be destroyed if we will carry out the winter cultivation system. Paris Green and Arsenate of Lead have been shown to be effective when sprayed or dusted on the plants. The latter is recommended to be the better as it is less likely to burn the plant, and too, it adheres much better. About four or five pounds of Arsenate of Lead mixed with wood ashes or some other carrier should be applied to the acre.

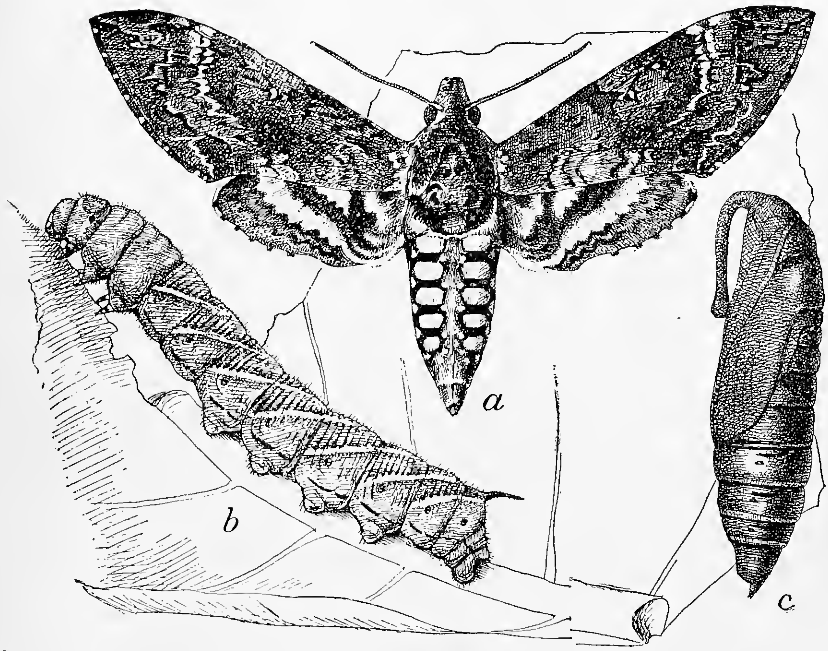


Fig. 6.—The Southern tobacco hornworm (Phlegethontius sexta): a, Adult; b, larva; c, pupa. (From Howard.)

Due stress should also be laid upon proper selection of a sprayer or dusting gun for the application of these chemicals. The tobacco interests of the State are rapidly increasing, especially in middle and parts of East

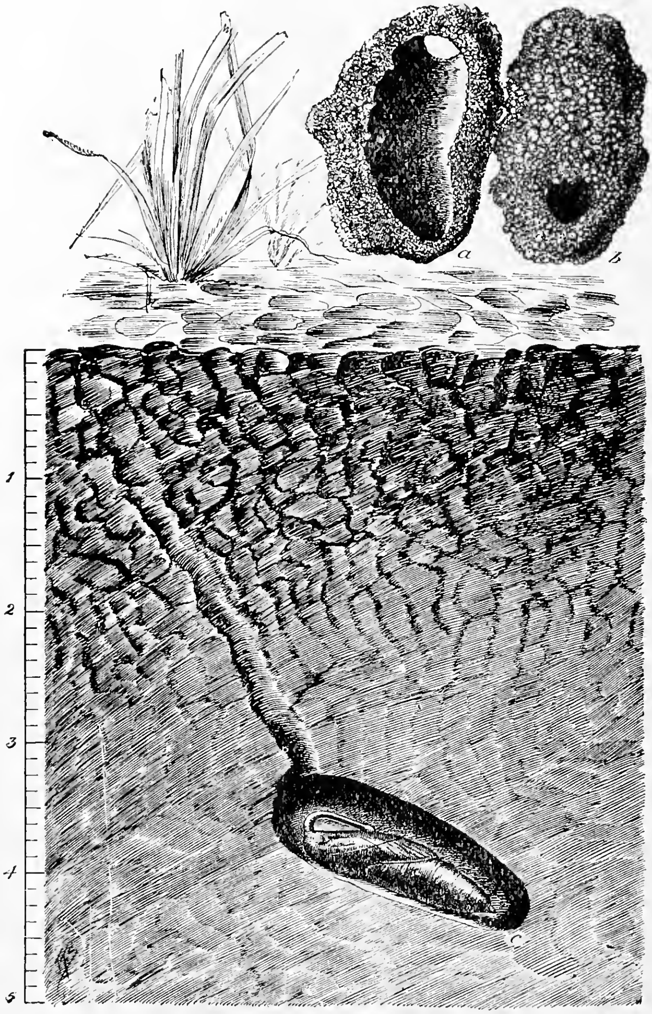


Fig. 7.—Hibernation of Southern tobacco hornworm: c, Pupa in hibernating cell in soil, at the depth at which pupation usually takes place in the stiffer soils; a, cross section of pupal cell viewed from below; b, pupal cell showing entrance hole of larva or "worm." Two-thirds natural size. (Original.)

Tennessee, where the Burley tobacco grows to perfection. Nearly half the counties in the State produce profitable crops of either the dark or light tobacco. As has already been mentioned it is a crop that suffers greatly from the attacks of insects, but if the growers will be on their guard and will seek the advice of an entomologist their efforts toward tobacco raising in Tennessee will be both timely and profitable.

HOME GROWN BALANCED RATIONS.

By L. C. PACE, '16.

"A balanced ration is one which contains the nutrients in proportions which meet the needs of the animal body for its best development, in other words, it is a ration in which the food is in harmony with the animal." It may be a single but, it is more commonly a combination of two or more. The balanced ration is no longer looked upon as a theory which does not hold good in practice, because it has been put to the test and has not been found wanting. The State experiment stations have conducted numerous feeding experiments with animals, in which balanced and unbalanced rations were compared. The results show that from 25 to 30 per cent less feed was required to make a given increase in weight with the balanced ration. The experiments were not confined to fattening cattle but to the growing and fattening of sheep, hogs, dairy cows and work horses. The same results held true in all cases.

One reason that the average farmer makes a mistake of feeding his stock rations that are not balanced is because it is easier, or he thinks it is, to grow feeds that are excessively rich in corbohydrates and lacking in protein. This comes about by the large amount of corn and timothy hay that is grown and used. It is impossible to make a properly balanced ration from these feeds. If he does use these feeds and makes a balanced ration he is forced to use a quantity of mill feeds that are rich in protein. These mill feeds are high and make a very expensive ration. The thing for the farmer to do is to grow the feeds that are necessary, as far as possible, and it is possible in the South to produce on the farm practically all that is needed to make up a good economical balance ration.

The cheapest source of protein is usually leguminous hays, including clover, alfalfa, cowpea and soy bean hay. If an abundance of either one of these can be grown it is simple to make a balanced ration. Cowpea, soy bean and alfalfa hay have comparatively the same amount of protein to the pound. Clover has a little less but is a superb forage crop. The growing of legumes has a twofold advantage to the farmers. First, they furnish the protein to balance the ration with which to feed the farm animals. Secondly, they add fertility to the soil which the corn and other grains have taken out. When a farmer is growing legumes he is both building up his soil and filling his pocket-books provided he feeds them on the farm and sells the finished products. Soy beans and cow peas are the easiest of the legumes to grow.

The North Carolina Experiment Station found out that an equal weight of cow pea hay was equal to the same amount of bran, wheat, oats; and also that cow pea meal was an economical and satisfactory substitute for one-half the usual grain allowance given farm horses and mules. The cow pea rations were also five cents cheaper per day. This

is a matter of considerable importance, and in fact, is much in favor of this feeding stuff for farm horses.

In grain production as a supplement to corn for fattening stock, no crop tested at Tennessee Experiment Station has proved the equal of soy beans.

The following are some suggested rations that can be grown on every farm:

Dairy Rations.

Cowpea or soy bean hay	15-20	lbs.
Corn	8-10	"
Grain	5	"
Cowpea hay	17	"
Corn silage	20	"
Soy bean straw	7.1	"
Silage	25	"
Ground soy beans	3.7	"
Corn and cob meal	3.7	"

Hog Rations.

Pea meal	3.8	"
Corn meal	3.8	"
Corn meal	4.9	"
Soy beans	2.	"
Corn "hogged off"		
Soy beans or cow peas "hogged off"		

Sheep Rations.

Soy bean and corn	1.2	"
Clover hay	1.	"
Corn stover	1.	"
Alfalfa hay	1.5	"
Corn meal	1.6	"
Cowpea hay	1.5	"
Corn meal	1.6	"

Horse Rations.

Cowpea hay	10	"
Corn and cob meal	12	"
Corn	10	"
Cowpea hay	15	"
Corn and cob meal	10	"
Clover hay	15	"

Fattening Steers.

Soy bean hay	12	"
Ground barley	8	"
Silage	20	"
Cowpea hay	12	"
Corn and cob meal	10	"
Silage	20	"
Alfalfa	15	"
Ground corn	4	"
Ground barley	4	"

These are not iron-clad rations but are rations that can be grown on every farm in the South. All these rations have been tried out at some experiment station in comparing different feeds and these have proved very satisfactory. Each farmer is to solve his own problem as to what crops he is to grow, but the soy bean and cow pea have their place on every farm. These two plants take from the air, by means of the bacteria in the nodules on the roots, and put back in the soil the element which is so high when it is bought in fertilizer. This element is nitrogen, which corn, cotton and tobacco take from the fields in such great amounts.

When cow peas and soy beans are grown the fertilizer alone is worth $10.19 a ton calculating nitrogen at 20 cents per pound, phosphorous and potash at 6 cents per pound. Two tons an acre is not a high yield, but with this yield, an acre of either is worth a ton of fertilizer besides the

humus and organic matter that is added to the soil.

The growing of either is not difficult. The most important thing is preparing a good seed bed. Some farmers like the cow pea better than the soy bean, but the soy bean has proved to have some advantages over the cow pea.

First. They stand erect and are more easily cultivated and kept free from weeds.

Second. The soy bean produces more grain per acre.

Third. The soy bean can be sown earlier as well as later in the season than the cow pea, being a more thrifty and hardy plant.

Fourth. The soy bean is richer in protein than is the cow pea.

The cow pea has some qualities that are more favorable than the soy bean.

First. A stand of cow peas is more certain than a stand of soy beans. Rabbits some times bite down the soy bean but never trouble the cow pea.

Second. The cow pea is much better suited than the soy bean for planting either with sorghum or corn, whether for forage or for soil improvement purposes.

Third. Cow pea hay is more easily cured without the loss of leaves and fruit.

From the above it appears that the soy bean is more valuable than the cow pea as a grain producer, whether to be pastured off by hogs or threshed and ground for general feeding purposes. The cow pea being better as a companion crop to corn and sorghum.

There are several different varieties of both cowpeas and soy beans, but experiments with the different varieties show that the whippoorwill cowpea and the mammoth yellow soy bean are the most favored for the general farmer of Tennessee.

As has already been said, the preparation of the land is very important in growing cow peas and soy beans. It insures a better stand and thereby a better yield is harvested.

These two crops should be planted about the first of June, giving the farmer time to harvest them before the cool weather in the fall.

There are two ways of planting them; one is to sow broadcast, but this way is not very satisfactory, as the stand is often unsatisfactory. The other, and better way, is to sow them in rows about 24 to 30 inches apart and cultivate them. This requires more work but the increase in yield more than pays for the extra labor. Also sowing in rows affords a clean cultivation and, therefore making a cleaner hay. As to the cultivation, one deep plowing may be given as in corn, but thereafter only a shallow cultivation is necessary. A two or three-inch mulch is sufficient.

The harvesting of these two great soil improvers is in some respects difficult. The cow peas are generally allowed to mature much of their seed so that they are harvested at a rather late stage of growth.

The soy bean should be harvested earlier in order to save as much of the foliage as possible. About the best way to cure them is to shock them on frames, especially if in cool and damp weather.

CROP ROTATION.

By F. G. SORRELLS, '17.

Probably there is no subject that has been so thoroughly discussed in agricultural literature or so earnestly preached at farmers' conventions as the subject of crop rotation. The entomologist preaches rotation in the control of insect pests. The soil expert recommends rotation in the conservation of the soil. The county demonstrator advises rotation in crop production. The stockman stands for rotation in successful feeding of live stock. And all demand rotation as essential to good farm management. Yet, the subject has lost none of its original interest, nor will it ever become old until farmers appreciate its value sufficiently to plan and practice rotation generally on their farms.

It has long been known that a succession of different crops grown upon any piece of land gives better returns than the same crop grown continuously. It is not practical to go into a full discussion of the subject here, but there are some underlying principles that may be briefly pointed out.

(1) All crops do not remove the same amount of nutrients from the soil. Some crops require large amounts of one fertilizing constituent while others take up more of another. Grains, for example, remove a large amount of phosphoric acid while the grasses remove very little. Potatoes remove relatively large amounts of potassium. A rotation of crops, therefore, will less likely cause a deficiency of some one constituent than a continuous growth of the same crop.

(2) There is a variation in the root system of different crops. Some are deep feeders while others are shallow feeders. A rotation should, therefore, include a deep rooted plant followed by a shallow feeder so that there will be an economical utilization of plant food.

(3) Some crops prepare food for others. Legumes for example gather nitrogen from the air and store it in the soil for its own use as well as those crops that are to follow. Grass crops leave organic matter in the soil. This is essential to the growth of any crop. All cultivated crops remove organic matter from the soil. A cultivated crop should, therefore, be followed by a non-cultivated crop.

(4) Some crops when grown year after year on the same soil injure the mechanical condition of the soil. This difficulty can be avoided by crop rotation.

(5) Some crops, it is claimed, develop a toxin in the soil which is injurious to their own growth.

(6) Obnoxious weeds are best controlled by a system of crop rotation.

(7) By rotation of crops plant disease and insects may be checked. Many insects spend their resting stages in the soil. A continuous growth of any one crop upon the soil favors the increase of these species by furnishing each year the particular plant upon which they thrive.

(8) Crop rotation enables the farmer to have a variety of food for his animals and his family. It prevents his ruin in case one crop should fail as may often happen under the one-crop system.

Crop rotation can not be over em-

phasized. It is the one need of the South. It is only a short time in the future until soil destruction will be considered a crime. A depleted soil can never be made fertile under a one-crop system of farming. Nor can the fertility of a rich soil be maintained without some well defined plan of rotation. It is, therefore, the duty of every scientific farmer to practice rotation on his own farm and preach rotation to his neighbor.

THE DOMESTIC SCIENCE GIRLS ENTERTAIN THE FARMERS' WIVES.

By KATHLEEN LEE, '15.

On Wednesday, May 20th, the Farmers' Wives met at Tennessee Hall. The following interesting program was carried out:

The Farm Home.

Report on Model Farm Home—Miss M. E. Frayser, Winthrop Normal, Rock Hill, S. C.

The Organization of the Farm Home for Health—Dr. Olive West, State Board of Health.

Demonstration of Bread and Biscuit Making—Mrs. Elizabeth Lauderback, Chattanooga.

Lunch.

The Farm Community.

An East Tennessee Venture in Rural Education—Miss Mamie Sloan, Cleveland.

Discussion—Led by Mrs. E. J. Wilbou, Calhoun.

Discussion of Community Organization—Led by Mrs. F. H. Franklin, Riverdale, and Mrs. Clara Boone Mason, Prospect.

Our Canning Club—Miss Mary Duncan, Tasso.

How I Handle My Tenth Acre—Miss Jessie Eldridge, Sale Creek.

The Social Side of Farm Life—Virginia P. Moore, State Organizer, Nashville.

The meetings were held in the large assembly hall on the third floor of Tennessee Hall. At twelve-thirty, the ladies adjourned to the second floor where a dainty lunch was served by the Domestic Science girls.

Menu.

Veal Croquettes

Potato Salad Sandwiches

Iced Tea Ice Cream

One of the best things of the day was the demonstration of bread and biscuit making by Mrs. Lauderback of Chattanooga. One of the professors suggested that she be allowed to make enough for the lunch. He evidently did not realize how many it would take and finally after much explanation, decided that it would be best for the girls to go on with their preparations.

Mrs. Lauderback said she used the same recipe three hundred and sixty-five times a year and then between times and each time it was "just right." She was kind enough to give the recipe to the ladies.

Another good demonstration was that of sun-cooked strawberry preserves. This is quite an improvement over the old method of standing over the stove for many hours

in the hot summer time—canning and preserving. No doubt, many of the ladies on their return will profit by this suggestion.

The assembly hall, reception rooms and dining room were beautifully decorated with cut flowers which Mr. Jinks kindly furnished. All the garments and some of the models which have been made during the year were on exhibit and these were admired by every one.

There were more ladies present at this meeting than the one of last year. These meetings at Tennssee Hall are looked forward to each year by both the ladies and the Domestic Science girls. It not only gives the girls practical experience in preparing and serving meals but it proves to the public that Domestic Science not only teaches them to prepare and serve fancy dishes but practical and substantial ones as well.

EVENING ON THE FARM.

By HELEN E. GALBREATH, '14.

The breath of evening lingers warm and sweet
O'er fields wherein the early grain is green;
And whistling gayly as he drives the herd
Far down the road the farmer's boy is seen.

He hears the birds that twitter overhead,
And mocks the very gladness of their lay!
No human heart in all this world of ours
So innocent and light, so free and gay!

Lo, where the rising mists ascend and curl
In wreath or wreath along the wooded plain
His eager thought divines the lazy brook
Long ere the herd its mossy banks can gain!

The thirsty cattle linger in the stream,
The boy looks on, nor urges them apace.
His eyes are fixed on yonder quiet pool,
His summer haunt, and favored fishing place.

There on the morrow, through long drowsy hours,
Reclining on the cool and shadowed slope,
With rod in hand, and length of trailing line,
The lad will scan the depths with anxious hope.

But now the twilight bids him hasten on,
Nor longer tarry on the winding way.
The lights of home anticipate its cheer,
Proclaim the night and hail the close of day!

THE U. T. FARMER

Scientific; therefore practical

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EDITORIAL.

The busiest of all the busy seasons of the year is again upon us. The bob white can sit upon the corner of the old rail fence and whistle for his mate, the crow can caw from his shade in the thicket, but the farmer can neither sit on the fence nor loiter in the shade. His place is now in the sunshine of the fields amidst his growing crops of corn, hay and cotton. To the market and truck-gardner it means that he must harvest his peas, lettuce, onions, and strawberries and put new crops in the ground. To the general farmer the season has come to cut his hay and get it safely in his barn. His wheat and oats and barley are soon to call for the binder. The growing crops of corn and cotton must be hoed and plowed. The ground must now be stirred often to conserve the moisture. Every minute is full of work. Even after the day's toil is over and the family is gathered around the supper-board, the father and his sons can be heard talking over the work of the past day and planning new tasks for the morrow. The housewife, too, comes in for her share and tells of her chicks that are hatching and of the fryers almost ready for the early market. Early on the following morning, even before day break, the stir may be heard in this home. With the crowing of the cock they are up feeding and preparing for another busy day. Such is the farmer's life in May and June. How busy, yet how full of interest is this life! To see from day to day your honest efforts translated into growing, waving fields of corn, to feel the bigness and fruitfulness of nature all about you, to be so lost in work that you hardly know you are tired until night-fall, to sleep the sweet sleep that comes after such toil,—these things prove life worth living and prove the farm home the happiest home of all.

AGRICULTURE THE HOPE OF THE COUNTRY.

There is not much to be said on the value of agriculture to the coun-

try. There is much to be done, however, if we measure our agricultural efficiency by its possibilities rather than compare it with previous conditions. Our agricultural people constitute the very foundation of our national efficiency. Agriculture is the immediate basis of country life. The cultivation of useful plants and the growing of domestic animals as a means of supplying the needs and luxuries of mankind is the oldest and noblest of occupations. The land is the source of all wealth. We look to the field, the garden and the forest for the necessities of life—food, clothing and shelter.

How much do we apprecite our fields, our gardens, and our forests? Do we believe in the good earth and its soil? Is it our desire to have our fields covered by grasses and growing crops, our gardens filled with fresh and wholesome vegetables and our hills covered with our native trees? What does our past attitude indicate? Let us look back a moment and see.

We learn that vast areas in the Orient, once well settled, have been washed away and are now barren wastes. Not only this, but the sands from these desolate regions have been driven by winds over adjacent fertile tracts and their usefulness completely destroyed. But it is not necessary to go to the Orient to find such tragical conditions. We have them here with us in a comparatively new land. Many New England farms have been exploited and abandoned for the richer promises of the west. Coming home to our own Southland we find the same ugly marks of neglect. A short drive through any farming section is enough to convince us of this truth. The fields that should be smooth and covered with clovers and grasses are too often gridironed by ugly, red gulleys. The summer showers instead of becoming a factor in increasing the crop yield on such a farm, serve only to wash away more of the soil fertility. In fact, everything seems to leave the farm except the mortgage.

Another sad neglect is that of our forests. The primeval forests which once clad our mountains in a wild and wholesome beauty are no longer seen. The woodman has ruthlessly exploited one of our greatest resources. Our hills that once gladdened the eye to look upon them are now barren and unsightly. The destructive forces of erosion have been at work and their ugly marks may be seen in most any community. The loss of soil by washing is a serious menace to the fertility, hence the productivity of the American farm. An eminent authority on this subject recently stated that soil wash is the heaviest impost bourne by the American farmer. Not only has this devastation of our forests stripped the land of its primative beauty and laid bare its soil to the processes of erosion, but the soil has been carried into our streams and has polluted them with mud and rendered them less navigable.

We do not wish to sound a pessimistic note nor intimate that the agricultural world is going to the "bow-wows." This would be far from true. The future was never so full of promise. Every year adds more victories to our list and opens up new fields for continued labor. Many of the mistakes of the past may be remedied and the more seri-

ous prevented from happening again. Devastated forests may be reforested. Our gulleys may be filled and winter cover crops sown to prevent further washing, and at the same time conserve the moisture for future crops. Clovers and grasses may be sown and grain crops raised. Good animals may be kept to crop the grass and eat the grain, thereby returning the fertility to the soil. We believe all this can be done. We do not believe, as some have claimed, that it is necessary for a nation to live, grow old, become weak and die, but that a nation like a river system should increase in beauty and strength in its onward course.

NEWS.

The East Tennessee Farmers' Convention which was held May 19-21, was the largest attended and the most successful ever held in this state. There were present at least 2,500 or 3,000 farmers, representing practically every county in East Tennessee. The program of the convention was an unusually good one, and the lectures and discussions covered every phase of agricultural activities so that no matter in what line of agricultural

Prof. H. A. Morgan Showing a Group of Convention Delegates Over the Experimental Farm

work one were engaged, he could obtain much valuable information as given by the agricultural experts from all over the country. The general program at Temple Hall was the most important part of the convention, but in addition to this the following sectional meetings were conducted, viz.: The general farm and live stock, dairy, horticulture, home making, boys' corn club, and tomato club sections. The exhibits of farm machinery, pure bred short-horns and the many things of interest in connection with the station furnished the crowd plenty to do between programs.

At the business meeting Thursday the following officers were elected:

Mr. H. M. Willson, McMinn county, president; Mr. W. C. Shaw, Roane county, vice-president; Capt. H. B. Clay, Hawkins county was elected honorary vice-president for life, and Prof. H. A. Morgan, secretary for life.

Provisions for the convention of 1915 were as follows: To rent a tent for one of the sections so the ladies can use one of the buildings for their meetings; the secretary was instructed to keep all fakirs off the grounds; absent and delinquent vice-presidents may be dropped by the convention and suitable substitutes appointed; all exhibitors must sign a contract; it is hoped board of commerce will supply sanitary drinking cups; to have music in the program, furnished by University band, and others; to have a reunion of all ex-presidents and devote one session to history and old time topics. A committee on state legislation for rural credit system was appointed consisting of W. C. Shaw, Roan county, chairman; John A. Jones, Knox county; Phil S. Taylor, Washington county; J. D. Hamilton, Hawkins county; Walter Hampton, Hamilton county. The president and secretary were asked to aid this committee in every way possible.

Many farmers who attended the convention staid over until Friday to attend the sale of short-horn cattle offered by the American Short-horn Breeders' Association. There was a total of thirty-six head offered for sale and the prices ranged from $90.00 to $310.00, with an average price of about $150.00.

Messrs. O. M. Shelby and Frank Sorrell are taking special work in entomology in preparation for working under U. S. Bureau of Entomology in the study of tobacco insects in Tennessee.

Mr. F. S. Chance has secured a position as county advisor and teacher in high school at Crossville, Tenn. His work begins about June 10, 1914.

Mr. C. M. Hume will locate at Tazewell, Tenn., where he will do teaching in the high school and county demonstration work.

Mr. F. W. Fleming has accepted a position to do teaching and county demonstration work at Lewisburg, Marshall county, Tenn.

Mr. O. L. Farris has been selected for fellow student at the University of Missouri for next year.

Mr. C. M. Haenseler has accepted a place as fellow in the botanical department of the University of Tennessee.

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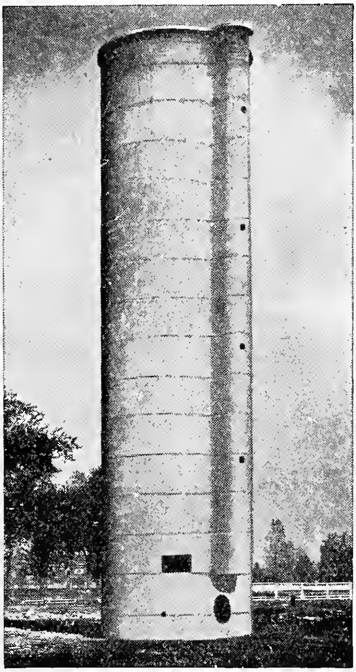
"THEY RENDER THE SERVICE"



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Where I can see a concrete silo
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mooley cow,
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a souse.
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wind may blow,
But it can't harm the
concrete silo,
It will last till Gabriel
starts his band.
S-I-L-O--that's the way
to spell it.
Look around! Look around!
At the silos in the land.

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